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JOHNSTONS'

Dental Miscellany.

VOL. I.——*JANUARY, 1874.*——NO. 1.

PROSPECTUS.

The establishment and continued support of a monthly periodical is an undertaking involving no inconsiderable expenditure of time or money on the part of the publishers. Nor, when both of these essentials have been freely given, will the result be satisfactory to the members of a cultivated and progressive profession, unless their expenditure shall have been controlled by the active energy of some mind or minds skilled in the art as well as the science to which it is designed its pages shall contribute, and thoroughly alive to the improved processes, theories and practices of an age than which no other has made greater progress.

To this undertaking we have long been urged, and from it we have always shrunk, reluctant to assume its labors and responsibilities. As, however, the 1st of January, 1874, approaches, and it seems probable that unless this responsibility is assumed by us, our city, and indeed our section of country will for another year remain unrepresented in the literature of the dental profession, we have consented to enter upon the task. To its creditable performance we pledge whatever we possess of resource, ability or energy; and if our friends of t profession shall afford us their literary support, and a frequent recital o h, facts and observations derived from their experience in dental prac. , we need have no fear of failure, but, on the contrary, may safely anticipate complete success. On every side we have the most cordial expressi s of interest in the project, and assurances of literary assistance from er, many of the best known and most experienced practitioners of the land, and already such reports from Europe as lead us to anticipate valuable contributions from trans-Atlantic pens.

We have named some of those who earliest proffered us their support, on the second page of the cover, but since these names were sent to the printer we have numerous promises of equal assistance from equally able sources. Relying upon these, our friends, we do not hesitate to promise subscribers a journal that shall be readable, and also one that, because of its record of experience, shall be invaluable and indispensable to any dentist anxious to improve himself, and to offer to his patients the best and latest methods of treatment.

As would be reasonably expected, then, the first object of the publishers of the DENTAL MISCELLANY is to offer its readers fresh contributions from the experience of active practitioners of dentistry upon matters of every-day interest in each of the departments of operative and mechanical dentistry, and on the treatment of diseases of the mouth. We have also arranged with Dr. Norman W. Kingsley, of this city, for several articles upon that branch of practice in which he is especially interested, and in which, perhaps, he has no peer, certainly no superior, viz. : the treatment of Congenital and Accidental Deformities of the Mouth and allied parts, more particularly the treatment of fractures of the jaw, regulating of teeth, insertion of artificial palates, treatment of cases of cleft palate. Of these latter deformities his practice has afforded some one hundred and fifty cases. His contributions will be fully and carefully illustrated, the illustrations of each article costing fifteen or twenty times the cost of a subscription to the MISCELLANY for the year. The value of these articles to any one in full practice cannot be too highly estimated.

Besides the original matter above referred to, we have invited (and still invite) original articles on subjects of general interest cognate to dentistry proper.

For example : One article is now in course of preparation on "The Best Form and Arrangement of the Operating Room," another on "The Conveniences of a Model Dental Laboratory," a third on "Leisure Hours of Professional Life." We hope that these essays, while affording entertainment, will not be without positive advantage to the reader. Besides such original matter we shall not fail to lay under contribution the current literature of the day, whether of our own or foreign lands, and in this respect shall aim to furnish an Eclectic Review of such matters of interest as are embraced under the four heads mentioned on our cover, and of which we design to treat, in so far as they ally themselves to dentistry.

It is also our purpose to give some prominence to Dental Jurisprudence—particularly to a record of cases of interest which have been

submitted to the courts for settlement. If occasion presents itself, we may offer now and then some new mechanical movement or device—with illustration.

In short, we do not propose to confine ourselves strictly to dentistry proper, and the reports of the proceedings of dental societies. We shall aim to present to our readers, promptly and fully, all reliable information attainable concerning any of the various anæsthetics—now in use, or that may be brought to notice—also all improved implements and tools for use in burring engines, and information concerning new uses to which these engines are found applicable. To the end that the very best articles may be secured upon these subjects of universal interest to the profession, we have decided to propose *Prizes for Competitive Essays*, under conditions recited on a subsequent page. In addition, and in the hope that our subscription list may *speedily* embrace the name of *every active practitioner* of dentistry, we propose, on the receipt of $2.60, (subscription price of the DENTAL MISCELLANY for a year, and cost of sending the premium), to mail to the sender a beautifully colored plate of the Fifth Pair of Nerves, copied from the French plates of L. Hirschfeld and J. B. Léveillè.

It is further described on first page of advertisements.

To produce one copy of this accurate and beautiful plate, would cost more than one hundred dollars, and the copy offered is every way as valuable as though no other existed.

JOHNSTON BROTHERS,

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A DENTIST FINED.

An action against a dentist for pulling the wrong teeth came before a court in Keene, N. H., the other day. The plaintiff, Mrs. Alice Lovell, being unavoidably absent by reason of having died, her interests were represented by her husband, who asserted that his wife gave the dentist, Dr. I. W. Russell, special directions to pull certain teeth, and not to molest certain other teeth ; but he made a clean sweep of one jaw, and was rapidly harvesting the crop in the other, when Mrs. Lovell recovered from the anæsthetic and shut her mouth. The suit was for $5,000 damages, but the jury, considering that it might have been a mere misunderstanding on the dentist's part, and that the plaintiff was dead, thought $20 about right.—*New York Times, Dec. 5th, 1873.*

SYPHILITIC TEETH.

By T. B. Hitchcock, M.D., D.M.D., Prof. of Dental Pathology and Therapeutics in Harvard University.

At the recent meeting of the American Dental Association at Put-in-bay, this question was asked: "Are certain peculiarities in the formation of the teeth, pathognomonic symptoms of hereditary syphilis?"

In the "Transactions of the Odontological Society of Great Britain" for December, 1858, may be found a paper which was read by Mr. Jonathan Hutchinson, "On the Influence of Hereditary Syphilis on the Teeth." In it he makes the statement, that certain variations in the shape of the teeth are diagnostic signs of congenital syphilis.

He says, speaking of these malformed teeth, "They are, I believe, quite peculiar to those who have suffered hereditary syphilis. This conclusion is based upon so large a series of observations, that I place the utmost confidence in it, and am now accustomed to make use of the teeth, as a means of diagnosis as to the syphilitic nature of certain symptoms. * * * Setting aside two or three instances in which I could not ask questions, I may aver I have never yet met with an instance in which the teeth were strongly characterized, in which subsequent inquiry did not completely confirm the suspicion of hereditary syphilis."

Many eminent observers agree with Mr. Hutchinson, among them Dr. B. W. Richardson,* Dr. Langdon Down,† Dr. E. Magitot,‡ Prof. H. W. Williams, M.D.,§ and Mr. Berkley Hill.‖

On the other hand, some of the prominent investigators of Germany do not accept the views of Mr. Hutchinson. Albrech and Prof. C. Wedl each differ from him. Prof. Wedl ¶ saying, "Adequate proofs therefore are still wanting of the occurrence of an hereditary syphilitic deformity of the teeth."

The peculiar condition of the teeth referred to consists in a change in shape, and also, at times, in the position of the incisors, the two centrals of the upper jaw being the test teeth. These, when first erupted, have, in the centre of their cutting margins, crescent-shaped depressions, as though the enamel, during development, were pinched from before

* "Medical History and Treatment of Diseases of the Teeth and the Adjacent Structures." London, 1860.

† "Transactions of Odontological Society of Great Britain." 1871.

‡ "Traite de la Carie Dentaire." Paris, 1867.

§ "Recent Advances in Ophthalmic Science." Boston, 18[illegible]

[illegible] Effects of Syphilis on the Teeth and Mouth," in Monthly Review of Dental Surgery. London, 1872.

¶ "Wedl's Pathology of the Teeth," page 14[illegible]

backwards, which render those portions of the teeth so thin, that shortly after eruption the thin portions break away, and leave a permanent crescentic notch. The teeth are usually of a peculiar color, narrower at their cutting edge than at their neck, giving them a "peg-shaped" appearance. They may stand apart, with a wide space between them, or may be close together. Not infrequently there is a deficiency in the depth of the alveolar process of the upper jaw, so that the centrals, and at times the laterals also, do not articulate with the incisors of the lower jaw; the patient is unable to bring these teeth together.

The condition of the teeth is seen in the accompanying plates, which first appeared in 1871, in the work by Dr. Williams, previously cited.

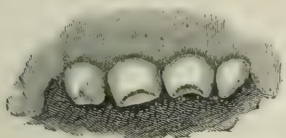
Fig. 1.

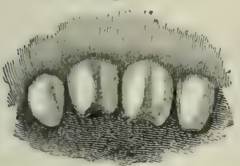
Fig. 2.

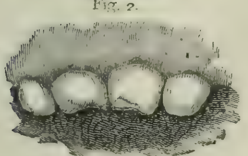
Fig. 3.

Fig. 1, is from a cast of the mouth of a boy about twelve years of age.

Fig. 2, is from a girl fourteen years of age.

Fig. 3, from a girl of seventeen, shows the appearance presented when the teeth have been worn, and the depressions are less deep.

The cause of this deformity of the teeth is due to ulcerative stomatitis, occurring during infancy. If the child who has inherited syphilis from the parent becomes the subject of syphilitic stomatitis, which usually occurs a short time after birth, we might expect to find some irregularity in the formation of the teeth. Or should syphilis be communicated by the mother to the infant, shortly after birth, who should have stomatitis as the result, provided it was at a sufficiently early age, we should probably have the same condition of the teeth.* And it seems to be the opinion of those who accept Mr. Hutchinson's views, that if the child does not have specific stomatitis at this early age, the teeth do not present this peculiar deformity, in other words, the teeth are not deformed as the result of the direct action of the syphilitic poison, but only from stomatitis caused by this poison.

*Mr. Berkley Hill, *op. cit.*, records a case which he thinks is the first instance reported, where this deformity of the teeth occurred as the result of *acquired* syphilis. The case occurred in 1864. Both parents were under his care for syphilis, the infant was brought shortly afterward, having the syphilitic eruption and inflammation of the mouth. After some months of treatment the child was apparently cured. In December, 1871, the child again came under his observation. The central incisors had erupted, were inclined toward each other, and had quite a space between them. Each presented the crescentic notch upon the cutting edge.

Mr. Berkley Hill, in the paper before alluded to, says, "My impression is that stomatitis has always been present when syphilitic teeth are produced, and indeed that it is essential for their development."

The question may be asked, Does not non-specific stomatitis cause the same result? Authorities say not,* although the specific is at times indistinguishable from the non-specific form of the disease, the diagnosis in these being determined by the aid of other symptoms, such as syphilitic eruptions upon the body, or the known specific taint of the parent.

Syphilitic stomatitis, authorities tell us,† is often attended with destructive ulceration of the gums and necrosis of the jaws. The inflammation and destruction of the alveolar processes is sometimes so great that several of the temporary teeth exfoliate.‡

Dr. James E. Garretson§ is of the opinion that syphilitic inflammation of the gums is "not an inflammation of the gum tissue proper, but simply of its mucous envelope, or, on the other hand, it is an inflammation commencing in the periosteum, and secondarily affecting the gum tissue."

It is evident that any considerable amount of inflammation of the tissues covering the jaws at a time when the germs of the teeth are developing, may cause a disturbance in their growth, an arrest in their development. As the crowns of the temporary teeth have become partially formed at this time, enamel and dentine having formed on the pulps of them all, they do not suffer any deviation from their normal shape; though after eruption they seem to show unmistakable evidence of defective structure.

It is not held that all persons suffering from congenital constitutional syphilis, or that all who have had specific stomatitis, necessarily present this peculiar appearance of the teeth; but that when this condition of the teeth is present, the person has inherited‖ the syphilitic taint, and has had, during early infancy, an attack of specific stomatitis.

As patients come under our observation, it is a difficult matter to ascertain whether there is, or has been, any exhibition of hereditary syphilis. The ophthalmologists possess advantages in this respect which we do not. Between the ages of ten and eighteen many patients come under their care for chronic inflammation of the cornea, interstitial keratitis,

*Mr. Hutchinson states, "I have made very extensive observations upon this point, and will venture a very confident opinion in the negative."

†Tomes's Dental Surgery, 1873, pp. 182, 497, 5[illegible].

‡Mr. J. Hutchinson, *op. cit.*

§"Diseases and Surgery of the Mouth, Jaws and Associate Parts," p. [illegible].

‖Or may have acquired the disease shortly after birth.—Mr. Berkley Hill, *op. cit.*

a manifestation of hereditary constitutional syphilis. They place so much confidence in the character of the teeth, as determining the presence of this poison, that an examination of the mouth usually confirms the diagnosis.

When these patients or their parents have been questioned in relation to the earlier manifestations of the syphilitic taint, it has, I think, invariably been found to have been present.

The evidence seems so conclusive, that this peculiar deformity of the teeth is due to the action of the syphilitic poison, in producing specific stomatitis, that we cannot fail to place great confidence in it. That it is not a pathognomonic symptom of congenital syphilis is proven by the case reported by Mr. Hill. That it is, however, a symptom of the infection of syphilis, either before or shortly after birth, with the concurrent specific stomatitis, we cannot satisfactorily dispute, and until *one* well authenticated case of this deformity is reported, in which beyond a suspicion of doubt there is no syphilitic taint, we have, perhaps, no other alternative but to consider it as such.

FRACTURES OF THE INFERIOR MAXILLA.

By Norman W. Kingsley M.D.S., D.D.S.

Fractures of the lower jaw are among the most difficult that the general surgeon is called upon to treat, and without the aid of a skillful dentist the success is rarely all that could be desired.

A little reflection upon the anatomy of the lower jaw and its muscular attachments will convince any one of the difficulties which will arise in attempting to keep the broken fragments in their normal position and allow any movement of the mouth for the reception of food.

It is impossible to make splints of universal application ; all efforts in that direction have proved comparative failures. Every case of a complicated character must have a splint made especially for it, and the making and adapting can be done by none other so well as by the dentist. In a healthy subject there is little treatment required other than the adjustment of the splint and its proper care.

The treatment of such cases makes the bond between general surgery and its specialty of dentistry very strong.

It has been a favorite idea with some Professors of Surgery that the general surgeon's skill should be equal to any and every emergency ;

hence a treatment of universal application has been fostered and the aid of specialists discouraged. But surgery gains no laurels by such efforts at independence, and in many instances the patient suffers from the want of the highest attainable skill.

The course pursued in the following described case will illustrate a method adopted by me a number of years since, and which has resulted in all cases successfully.

Lawrence McCarthy, a miner, aged 27 years, was admitted to Bellevue Hospital, May 2nd, 1872, suffering from a compound fracture of the right side of the inferior maxilla, which occurred three days before, as the result of an explosion of nitro-glycerine.

The bone was broken in three places, viz. : at the symphysis ; between the bicusped teeth and at the angle.

There was considerable displacement of the fragments, the anterior piece containing three incisors, the canine and first bicusped being much depressed and pushed backward ; the second or middle fragment was considerably elevated from its normal position.

Fig. 1.

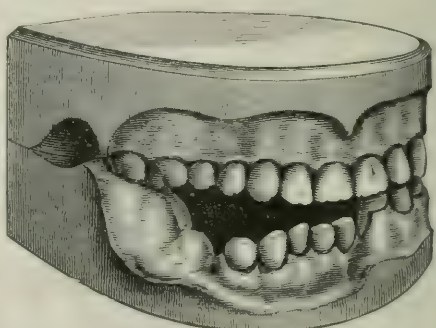

Fig. 2.

There was an external wound of two inches in length, reaching back from the symphysis along the line of the jaw. This wound was dressed with carbolic acid and glycerine, and a four-tailed bandage applied.

The next day the teeth at the anterior fracture were wired together, but the strain was so great that the wires broke after a couple of hours.

The application of wires to hold the fragments was repeated from day to day for several days, but continued to fail.

May 9th, the middle fragment containing the molar teeth was detached.

Figure 1 represents this sequestrum full size.

May 12th, two weeks after the accident had occurred, impressions were taken preparatory to making an interdental splint.

The condition in which the jaw was found at that time, is well represented in Fig. 2. (Figs. 2 and 3 are reduced one-third from the full size.)

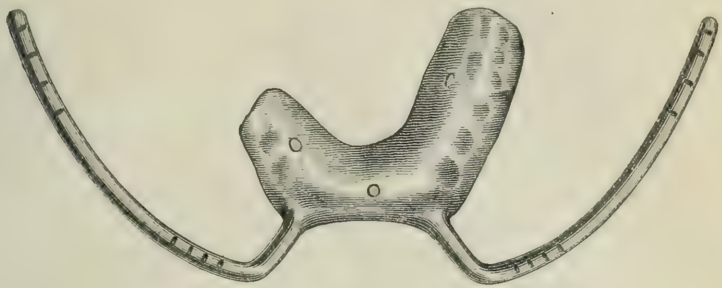

Fig. 3.

The splint, which is represented by Fig. 3, was applied upon the 19th, substantially as shown in Fig. 4.

No effort was made to reset the jaw after the impressions were taken, until the splint was adjusted. The fragments resumed their natural position immediately upon the introduction of the splint, and the application of the external bandage, as seen in Fig. 4.

This bandage was a simple, broad, elastic rubber band, such as are

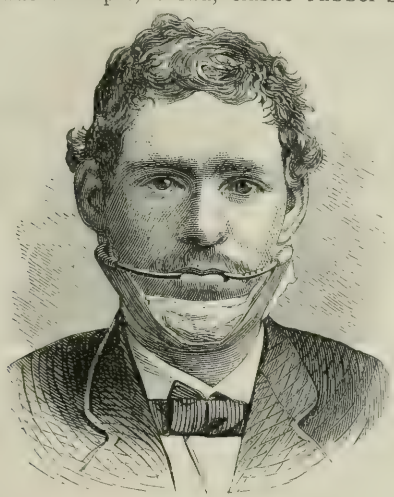

Fig. 4.

for sale by stationers ; covering a pad over the chin, made of gutta percha, softened and modeled into proper form.

The elasticity of the band was such as to force the fragments into the splint and bind them firmly to it ; thus allowing entire freedom to the jaw for the reception of food.

The superior surface of the splint was carefully articulated to the upper teeth, and a very little experience enabled the patient to masticate without difficulty.

During a period of ten days after the adjustment of the splint, it was occasionally removed and kept off for some hours, in consequence of extreme tenderness of the external surface.

After May 28th, it was worn continuously (except such removal as was required for cleansing) for two months, when union was found to have taken place, and the articulation of the teeth correct.

The impressions, and the making and adjustment of this splint, was done by my assistant—Dr. K. C. Gibson.

It will be readily inferred that the form of the jaw, when union takes place, will correspond with the form given to it by the splint, and that it is essential that the utmost nicety and accuracy be observed in its manufacture.

In the experience of the writer it is impossible to bring the fragments of an inferior maxilla, where there is a compound fracture, into perfect apposition and retain them there while an impression is being taken ; neither is it necessary nor desirable that it should be attempted.

Such displacement as can be corrected with little difficulty may be done, but, further than that, nothing will be gained, as the real resetting of the jaw will occur in the plaster model.

An impression of both upper and lower jaws will be required, and there is no substance so suitable for this purpose as plaster of Paris.

Models should be made and articulated as shown in Fig. 2.

The displaced portions of the jaw, as shown in the plaster, must then be separated, accurately articulated to the upper teeth, and the plaster fragments cemented together preparatory to forming the splint.

Just here lies the key to success : In all cases where there are one or more teeth on each side of the mouth, articulating with those of the opposite jaw, it will be almost impossible to make a mistake if care is exercised.

The articulating surfaces of antagonistic teeth are so peculiar and unmistakable that there should be no excuse for making an error in resetting this plaster model ; and yet, if any discrepancy occur, it will be fatal to the success of the appliance.

The splint may be modeled up of wax or gutta percha, upon the re-

constructed plaster cast, substantially as seen in Fig. 3. It is desirable that it should embrace each fragment of the jaw. The arms may be made of any strong wire; a couple of discarded excavators bent into suitable form furnish a very convenient means to this end. They must be inserted in the wax model, and the splint duplicated in vulcanite.

When completed, if no error has occurred, there will be very little difficulty in the adjustment, as before described.

THE PRAYER OF AGASSIZ.

Professor Agassiz, at the opening of the Anderson School of Natural History, after a few modest words, felicitously suited to put all their minds into fellowship, said tenderly and with touching frankness, "I think we have need of help. I do not feel that I can call on any one here to ask a blessing for us. I know I would not have anybody pray for us at this moment. I ask you for a moment to pray for yourselves." Upon this the great scientist—in an age in which so many other great scientists have concluded that praying is quite an *unscientific* and very useless proceeding—bowed his head reverently; his pupils and friends did the same. There in silence that was very beautiful, each spirit was free to crave of the Great Spirit the blessing that was needed. For our own part, it seems to us that this scene of Agassiz and his pupils, with head bowed in silent prayer for the blessing of the God of Nature to be given to that school then opened for the study of Nature, is a spectacle for some great artist to spread out worthily upon canvas, and to be kept alive in the memory of mankind. What are coronations, royal pageants, the parade of armies, to a scene like this? It heralds the coming of the new heavens and the new earth, the golden age when Nature and man shall be reconciled, and the conquests of truth shall supersede the conquests of brute force.—***Rev. Dr. Deems, in Christian Age.***

ANOTHER DEATH.

Following hard on the death in Boston, Mass., from the inhalation of chloroform and ether, we hear from the neighboring town of Lynn of the death of Mrs. J. W. Homan, who took pure ether at the hand of a surgeon, who was about to remove an ovarian tumor. In our next issue we will give a short statement of the facts in this case.—ED.

"GUSH."

By W. Geo. Beers, L. D. S., Montreal.

It may possibly be a creditable characteristic of medical and dental human nature, that it is so ready to welcome novelties and new inventions that tend to ameliorate pain or remove disease. The undoubted enthusiasm manifested by both professions in their conservative branches, may, to the cynic, be regarded as a safe kind of emotion, so long as the tendency to disease is so general, and the receipt of Methusaleh for longevity yet undiscovered. A great deal of good advice goes unheeded. If it was all taken, would it be so lavished? Yet no one but a chronic grumbler can analyze the human heart, so as to satisfy himself that the faithfulness in discovery and invention, which marks the medical and dental professions, is not worthy of the highest meed of praise and admiration.

As a rule, however, there are too many of both professions prone to "gush" upon the appearance of any new method of practice or improvement. In dentistry, this is very marked. Upon a merely superficial trial, possibly upon only examination, or because personal friends of the introducer, some are ready to set down their opinions in the most positive and complimentary manner. I have seen so many horns drawn in, after the most adulatory certificates published in print, that it has caused considerable suspicion in my mind as to the value of such certificates at all. Of course there are honorable exceptions. One qualified operator will tell you that he wouldn't take its weight in gold for such or such an article if he couldn't get another, while an equally qualified confrere, having had an equal experience with it, is anxious to dispose of it for half its cost. One operator has "never failed" with a certain mode of treatment; another, equally qualified, has never succeeded. Of course there are idiosyncracies and circumstances which influence these matters. If one attempts to make nitrous oxide gas by transposing the conducting pipes, and is too proud or sulky to ask advice from a confrere, no doubt he will have the memorable result of a Montreal colleague of unenviable notoriety, or if, in capping an exposed pulp, this tenderest of tender structures is treated as if it were a nail, no doubt that pulp will kick against the pricks, and disaster ensue. We know how prone we are to blame materials and accessories, instead of ourselves. It is an expeditious way of ending a diagnosis or a doubt, but it is scarcely logical or scientific, and, even as common sense won't hold water.

In some measure the habit of gushing about everything new brought out by individual dentists or depots is national. It is not as common in Europe. The atmosphere of this continent, upon which is saddled so many human and physical ills and anomalies, may be perhaps held to account. The natural desire to arrive at perfection has no doubt something to do with it. But if David lived in our time, and read the praise lavished indiscriminately upon some of the most perfected humbugs, he would not likely retract in his leisure, the sweeping opinion of human falsity which he said in his haste. The gushing aptness has become a nuisance. If genius requires gross flattery for stimulus, and dishonest puffing for pay, let us, for the sake of honesty, work out our own problems, and trust alone in our own old way.

There is a wide difference between the human vanity that is blind to its errors, and that even convinces its own conscience that it is as near perfection as humanity is likely on this earth to attain, and the deliberate praise bestowed upon trivial novelties, whose only merit is in presenting something new for trial. I could particularize some of the silliest and most obstreperous inventions or *soi-disant* "improvements" which have been foisted upon the profession within the last few years, that have only profited the parties who pushed them. In matters of practice, in trials of instruments and materials—yes, even in dental college education, which, in the present state, is, in my opinion, a "vanity of vanities"—if we except the creditable higher *status* which some of the profession are determined to maintain, by not granting their diplomas to quacks of five years' practice, who attend *one* session, (for many quacks can pass an examination, judging from facts,)—in these matters I think we are too apt to "gush."

ELASTIC PROFANITY.

At a summer festive gathering on one of the Thousand Isles of the St. Lawrence, last summer, the Rev. Dr. Pullman, of Peoria, playfully gave, as a complimentary toast, "The health of the inventor of Elastic Profanity," in allusion to Dr. S. C. Barnum, of this city, who happened to be present, and who is well known in the dental profession as the author of the *rubber dam.* This is a device now in common use, for keeping fillings dry during the operation of tooth plugging, and is almost as indispensable for success in dentistry, as chloroform is in surgery.—*Scientific American.*

OXYGEN GAS AS A REMEDY IN DISEASE.

From New York Medical Journal.

By Andrew H. Smith, M.D.,

Member of the Academy of Natural Sciences, Philadelphia ; Corresponding Member of the Gesellschaft fur Heilkunde, Berlin ; late Assistant Surgeon and Brevet Major U. S. Army, etc.

CHAPTER I.

HISTORY.

The therapeutical history of oxygen dates almost from the moment of the discovery of the gas. A few months after he had succeeded in demonstrating oxygen as a separate principle, Priestly discovered its relation to animal life. He found that a mouse confined in a limited quantity of this gas lived at least twice as long as in a like quantity of common air. This fact led him at once to the suggestion that this agent might be usefully employed in cases of disease in which there was deficient vitality. At the same time, the effect of plunging a burning body into oxygen inspired him with a misgiving that oxygen could not be inhaled to any considerable extent without danger of exciting excessive action in the system, that the patient would "*live too fast*"—a phrase which, down to the present day, never fails to rise to the lips of the practitioner to whom this therapeutic measure is suggested for the first time. Thus early were the possible remedial uses of this agent foreseen, and, at the same time, an erroneous idea advanced, which has maintained its hold upon the professional mind, and prevented much good which might otherwise have been attained.

During the fifteen or twenty years following the discovery of Priestly, attention was directed more to the physiological and chemical relations of oxygen than to its use as a remedy. The part played by it in the animal economy was made the subject of investigation by Spallanzani, Fontana, Barthollet, Lavoisier, and others. To Lavoisier belongs the credit of first demonstrating the composition of the atmosphere, and the changes produced in the blood by respiration. Following in his footsteps, Spallanzani showed that the consumption of oxygen was in direct ratio to the muscular activity of the animal. For instance, he found that the chrysalis consumed an exceedingly small amount, the caterpillar a much larger proportion, while the active *imago* demanded a very large quantity for its support.

These researches led to the grand discovery that the new element was the only one, a constant supply of which was necessary for the continu-

ance of life. Food and drink could be withheld for days; even the nitrogen of the atmosphere could be excluded for hours, and yet no serious injury would result. But the animal *began to die* from the instant the supply of oxygen was cut off. No other element stood in this relation to life. No wonder, then, that it was called *vital* air, and that the discovery was thought to have begun a new era for humanity.

The first case in which oxygen was actually employed as a remedy, was one reported by Caillens, in 1783. I can find only a reference to this case, which was published in the *Gazette de Santé*. But, in the year following, Jurine, of Geneva, published an essay, in which he cites, at some length, a case of phthisis in a young lady, which was very much benefited by daily inhalations of oxygen. In 1789, Chaptal, of Montpellier, reported two cases of phthisis, in one of which the gas produced great relief while its use was continued, but in the other the effect was not beneficial.

At about this period the French Government desired an expression of opinion from the Academy upon the value of oxygen as a remedy, and Fourcroy was selected to prepare a report. In this report, and in other works which followed, he resigned himself to a current of speculation which drifted him far away from the truth. He saw the effect of oxygen in the action of every remedy, even of muriatic acid, the composition of which was not then known. He claims to have employed oxygen in a considerable number of cases of phthisis, and to have noted a rapid improvement for two or three weeks, after which a violent inflammatory action was set up, and the progress of the disease was greatly accelerated.* But his subsequent experiments on animals, in which he describes a state of fever occurring, which eventuated in gangrene of the lungs, led to the suspicion that the gas which he employed contained some irritating impurity which the imperfect chemistry of the day did not enable him to discover. He became, nevertheless, the founder of a school which interpreted all therapeutical effects by the supposed relation of the agent employed to the oxygen of the system. But it was not until Beddoes began his observations that any valuable practical results were obtained.

In 1789 Beddoes published his book entitled, "Considerations on the Factitious Airs." He was at that time Professor of Chemistry at Oxford, but none the less devoted to the practice of medicine, in which he had already attained a high position. To him belongs the credit of being the first to approach the subject without a theory to sustain. It

* Annales Chimie, 1789.

was not until he had accumulated a large number of facts that he attempted to arrange and classify them. His attempts at generalization were not always attended with the happiest results; but the readiness with which he relinquishes a theory the moment it is found to conflict with fact, gives a rare impression of candor and impartiality to his work. The scope of the work includes observations upon several gases besides oxygen, especially carbonic acid and hydrogen.

His physiological experiments are of great interest. The principal results which he arrived at were the following:

Oxygen produces a remarkable power of resisting asphyxia. It appears that, when the blood contains an unusual amount of oxygen, the animal is better able to support a deficiency of respirable air, or even the presence of an irrespirable gas.

Animals which have respired oxygen resist longer the action of frigorific mixtures.

The action of oxygen seems to be localized principally in the muscular system.

Oxygen is, in the highest degree, a stimulus to the irritability of the heart and blood-vessels.

The last conclusion is one which succeeding observers will scarcely endorse to the fullest extent. As a stimulant to the circulation, oxygen is certainly far inferior to alcohol; indeed, in many cases, its stimulating effect is scarcely perceptible.

A few isolated cases of success in the therapeutic use of different gases encouraged Beddoes to set on foot the project of a Pneumatic Institute, in which this mode of treatment could be tested on an extensive scale. The plan enlisted the co-operation of Sir H. Davy, who gave himself with ardor to the chemical part of the work, and of the eminent engineer, James Watt, whose genius left nothing to be desired in the mechanical appliances for administering the gas. Probably a more brilliant triumvirate was never combined in the furtherance of a scientific object.

In pursuance of their plan, a building was erected by public subscriptions. It contained small compartments, the atmosphere of which could be charged with any desired gas. In these rooms the patients were allowed to pass a certain time daily.

The principal results obtained by the use of oxygen are summed up in the following table from a review of Beddoes' work which was published in the *British Library*:

CASES TREATED	Cured.	Relieved.	Not benefited.
Obstinate Ulcers	2	2	..
Leprosy (?)	5	..	..
Spasms	3	2	..
Gutta Serena	..	2	3
Chlorosis	5	2	..
Epilepsy	1	..	5
Asthma	11	..	3
Cancer	..	..	..
Dropsy of the Chest	2	1	
Hypochondria	..	..	..
Dyspepsia	3	..	..
Dropsy	2	1	1
Hydrocephalus	..	1	..
Headache	2	2	..
Poisoning by Opium	1	..	..
Paralysis	2	1	1
Scrofulous Tumors	2	1	..
Deafness	1	..	..
White Swelling	1	..	..
Scorbutus	1	..	..
Venereal	1	..	..
Melancholy	1	1	..
General Debility	1	..	..
Continued Fever	1	..	..
Intermittent Fever	1	..	..
Coldness of Extremities	1	..	..
Total	49	39	14

It will be observed that no cases of phthisis are included in this table. The explanation of this is to be found in the peculiar views entertained by Beddoes, as to the relation of oxygen to this disease. Accepting without question the reports of Fourcroy as to the ultimate acceleration of the disease by oxygen, he framed the theory that in phthisis there was a change, either in the constitution of the blood or in the substance of the lung, that favored the absorption of oxygen, which was therefore already present in excess. For this reason he considered oxygen as absolutely contraindicated.

In scorbutus, on the contrary, he supposed that there was a deficiency of oxygen in the system, which he thought should be supplied by artificial means.

The labors of Beddoes did much toward establishing the true position of oxygen as a therapeutic agent. They demonstrated, on the one hand, that the ideas at first entertained as to its curative power were extravagant, and, on the other, that it was an agent capable of producing good effects in many cases not reached by ordinary means. The number and variety of diseases in which the treatment was found beneficial, suggest, at first sight, a certain air of charlatanism, but subsequent observers have corroborated nearly all his statements. Nor, when we consider the physiological relations of oxygen, is it more surprising that

its use should be applicable to a large range of cases than that modification of diet should be beneficial in so many diverse diseases.

It is very remarkable that results as satisfactory as those obtained by Beddoes should not have led to a more general adoption of the treatment. But, with the exception of Hill and Thornton, who were contemporaries rather than successors of Beddoes, scarcely any British physician seems to have become interested in the matter, and it was allowed to die out with its original promoters. This was doubtless largely due to the difficulties which then beset the production of the gas, and its transportation to the bedside of the patient. Chemical manipulations were then but little understood, and chemical apparatus was very imperfect. Caoutchouc was unknown, and this fact alone would have made that very difficult which is now extremely easy. Indeed, when we consider the part which this substance now plays in the manipulation of the gases, it is not too much to say that its introduction was a necessary preliminary to their general use as remedies.

While Beddoes was carrying on his observations in England, the therapeutic use of oxygen was exciting no little attention in Germany. Numerous experiments and observations were made during the decade preceding the opening of the present century. Prominent among them were those of Girtanner, who, following in the footsteps of Fourcroy, gave arsenic dissolved in nitric acid for a large range of complaints, under the impression that the solution imparted oxygen to the system. He was charmed with the effects of *oxygen* given in this way in *intermittent fever*. In the midst of similar speculations and theories, which seem to have taken the place, for the most part, of observations on the practical use of the gas itself, it is not surprising that little real progress was made in determining the true value of the latter.

At Geneva, however, the use of oxygen fell into more practical hands. The results obtained by Jurine served to encourage others. Odier, then a prominent physician at Geneva, took up the new treatment with great zeal, and the *Society for the Advancement of the Arts and Sciences* caused the founding of an institution similar to that of Beddoes. But, as in the former case, this was short-lived, and with its decline the whole subject of the medicinal use of oxygen sank into oblivion. The frightful epidemic of cholera in Europe, in 1832, brought it again into momentary notice, but, as it failed to answer the expectations of those who employed it, it relapsed into its former obscurity.

It is only within the last fifteen years that any serious attempt has been made to bring this agent again into use. Dr. Riadore, it is true,

published some observations upon its use in 1845, recommending it in cases of indigestion, debilitated conditions of the liver and kidneys, nervous affections, asthma, etc. But his cases were not numerous or striking, and failed to arouse the attention of the profession.

In 1857 appeared the first edition of a work on Oxygen, by Dr. S. B. Birch, of London. I have not been able to procure a copy of this edition, and the second, issued in 1868, seems nearly a new work. The writer claims to have presided at the *renaissance* of oxygen, and takes to himself the credit of having instigated all that has been done in the past few years to place its use on a solid foundation. His book consists of a selection of cases, preceded by some general remarks upon the properties and uses of oxygen, its *modus operandi*, etc. His ideas with regard to what he styles the *quasi-nascent* condition of oxygen are very peculiar, and are not borne out by the experience of others. Moreover, his style is singularly obscure, and his book lamentably lacking in practical directions for the administration of the remedy. While constantly insisting upon the necessity of *judiciously* selecting cases for treatment, of *judiciously* administering the gas, and of the *judicious* use of adjuvants, etc., he does not give a single practical rule for determining what is judicious in the premises.* The cases which he publishes are very striking, one might almost say, marvelous; and the impression which the work as a whole is calculated to make upon the reader is that, in the hands of the author, oxygen is almost a panacea, while at the same time it would be hopeless for the general practitioner to attempt to grapple with a treatment so intricate, and demanding such peculiar skill.

In sharp contrast with this work is the article on Oxygen in Demarquay's *Essai de Pneumatologie Medicale*, published at Paris in 1866. A little too diffuse, perhaps, it is still plain, simple, and to the point. The author tells his story as of one who has studied the literature of the subject, made some experiments himself, and treated quite a large number of cases by the use of oxygen, sometimes successfully, sometimes not. With reference to its use in some diseases, while giving the experience and opinions of others, he states frankly that he has had no experience himself, and does not feel competent to judge of its merits. While it appears to me that some of his experiments on the physiologi-

*In the first edition of this essay the following *practical* rules were overlooked: "In testing it we must recognize practically—1. Heat, polarization, motive power, associated with the oxygen atom; 2. The same forces in the living organism; 3. The mutual relations of these forces, inorganic or organic, in connection with *individual constitution* and various perversions from the healthy standard, as well as under medicinal modification" (!) p. 45. [Second edition.]

cal effects of the gas are defective, yet others are novel and extremely valuable. His article is marked by perfect candor and frankness throughout, and is by far the best treatise upon the subject extant.

Dr. Hermann Beigel, in his work on Inhalation, published in London in 1866, presents a few considerations upon the use of oxygen, and cites a number of cases from his practice, in which he has used it with more or less benefit. He invented an apparatus for the production of the gas, according to Fleitmann's process, from the chloride of lime. His treatment of the subject is candid and unpartisan, and his conclusions demand respect.

A new era in the history of oxygen is being inaugurated by the invention of Téssie du Môtay, by means of which the gas can be produced in immense quantities from the atmosphere, and at an insignificant cost. Its possible future in relation to medicine and hygiene can as yet be only dimly discerned. When we shall be able to regulate the proportion of oxygen in the atmosphere of the sick-room as easily as we now regulate the temperature; when closely packed and ill-ventilated tenements can be supplied with this element, the free enjoyment of which is necessary to health; when by its use the contamination of the atmosphere by the furnaces of factories and machine-shops shall be prevented or counteracted, who can tell what will be the sum-total of the result? Yet all this seems now attainable whenever the public shall become sufficiently awake to its importance.

Continued in No. 2

ANNUAL MEETING OF THE MASSACHUSETTS DENTAL SOCIETY.

Anæsthetics Discussed.

The Massachusetts Dental Society began its annual session Dec. 11th, at 11 A. M., at the Meionaon. Vice-President G. T. Moffatt, of Boston, called the meeting to order, and announced that the President, Dr. J. H. Batchelder, of Salem, was necessarily absent, on account of an accident which occurred at Salem Wednesday, and by which he was injured. A dispatch was sent, on motion of Dr. S. J. McDougal, expressing to Dr. Batchelder the sympathy and regret of the Society, and inquiring into the extent of the injuries sustained by him.

The next business was the discussion of the following questions: "Is the administration of chloroform in dental operations justifiable?"

Dr. G. T. Moffatt offered some remarks, first calling attention to the articles which had been published in medical journals, and claiming that any dentist was criminally ignorant who would administer chloroform.

Dr. L. D. Shepard spoke of some evidence which was given in the recent investigation on this matter by persons who had not had much experience in dental matters.

Dr. Dudley, of Peabody, made reference to the dental establishment opposite the Museum. Here it was that Morton began his experiments with ether, after having stolen his idea. Here it was that Cummings began his dental career, and here occurred the affair which has caused dentists to blush with shame. There are three classes who use chloroform, the first class being those who are so utterly ignorant and destitute of knowledge on the subject that they do not know the difference between chloroform and ether. A second class are those who, knowing the difference, ignorantly mix them together, thinking that the ether reduces the strength of the chloroform, or that chloroform increases the strength of the ether; and the third class are those who, for the sake of securing a little time and avoiding a bad smell, willfully take the lives of their patients in their hands and give chloroform.

Dr. S. J. McDougal, of Boston, said that dentists have less to do with chloroform than physicians. He expressed himself strongly against the use of chloroform.

Dr. G. F. Waters said that if any anæsthetic is used it should be one containing as much atmospheric air as can be mixed with it.

Dr. T. H. Chandler said because doctors in England use chloroform it is not for this Society to call them all rascals, nor should it apply that term to physicians and dentists who use it in Boston.

Dr. Wetherbee, of Boston, expressed his preference for ether, and seldom used chloroform except in extreme cases, and then only in quantities of three drops, mixed with ether.

Dr. E. Page, of Charlestown, said that for eight years he had used nitrous oxide gas, considering it safer than chloroform and as safe as ether, because chloroform kills without warning, and ether and gas do not. A person may be very careless with them and still avoid fatal results.

Drs. Drake and Leach further discussed the subject, the latter being strong in his denunciation of a practice which had been proved to be so dangerous. The testimony of the best medical authorities showed that

a single drop of chloroform might be fatal in its results. Drs. Leach, Page and Hitchcock were named by the chair as a committee to prepare a series of resolutions in regard to this subject. At 1½ o'clock the meeting adjourned till 3.

AFTERNOON SESSION.

The afternoon session was called to order by Dr. Edw. Page, the Treasurer, and Dr. L. C. Taylor was elected temporary Secretary.

Dr. G. F. Waters was called on for remarks upon the subject of Anæsthetics. He instanced the case of a lady who failed to yield to the effect of one pound of ether, besides gas, and who remained conscious. He thereupon put three drops of chloroform upon the ether sponge, and the patient almost immediately dropped into a quiet sleep, and the dental operation was performed with success.

The committee submitted the following resolution:

Resolved, That we, the members of the Massachusetts Dental Association, do emphatically condemn the use of chloroform as an anæsthetic, and any member of this Society who shall administer it hereafter, shall be censured by this Society, and ought to lose the confidence of the public.

Dr. Leach remarked that the use of chloroform had been regarded by dentists as unprofessional. He said that some dentists did not take care enough in observing the pulse of patients when etherized.

Dr. Kidder, of Lawrence, thought the resolution too sweeping. Chloroform might be used safely under some circumstances. Ether is a pet chicken of Harvard College, and therefore whenever chloroform is spoken of in this vicinity it is claimed that our own crow is the whitest. Chloroform is used in ninety-nine cases out of a hundred in Europe and the southern part of the United States. It was not generally accepted as sound medical doctrine that chloroform is a dangerous agent.

Dr. Hitchcock thought the Lynn case should not be quoted, as the evidence was not yet all in.

Dr. John T. Codman was now introduced, to make the annual address. He said that dentistry can be truly called the minor surgery. It seldom has to deal with those serious difficulties that involve the issues of life and death, as does the technical surgery of the profession. After speaking of the beginnings of dentistry, he said that the dentist's professional career now begins in the college and the hospital. In this connection he remarked that the fees usually obtained by the dentist were an insufficient recompense for the time and professional skill expended. Few persons have any spontaneous feeling of gratitude toward

the dentist, as is often the case when the physician has rescued the sick from seemingly impending death.

Dr. Wetherbee, the discussion being resumed, offered the following:

Whereas, in the administering of chloroform there is justly believed to be increased danger as compared with ether or nitrous oxide gas, therefore,

Resolved, That the Massachusetts Dental Society do hereby advise the use of ether or nitrous oxide gas for producing insensibility to pain, possessing as they do properties assuring greater safety, when such an agent is admissible in surgical operations.

Dr. Chandler said that the dental profession in general had begun with the use of anæsthetics, without any special knowledge of the properties of the agents used, and what they now knew they had learned by experience in its use. If Harvard College or any other college could give the dentists any information or caution, it ought to be received and acted upon.

Dr. Shepard said that if the resolution passed, the only alternative for some of the most skillful and competent members of the Society would be to withdraw, as otherwise they would be constantly under censure. He offered the following as a substitute for all preceding resolutions:

Resolved, That in the opinion of the Massachusetts Dental Society, the use of chloroform in dental operations is unjustifiable, and that the public be requested to co-operate with the profession in bringing it into disuse.

Dr. Chandler moved to strike out all words after the word unjustifiable. This was carried, and the resolution was adopted, omitting the last clause.

After voting to remit the dues of members under the old organization, the afternoon session was closed.

EVENING SESSION.

In the evening, order was called at 8 o'clock. The first business was the report in relation to membership. The following were reported upon favorably and were admitted to the Society: Oliver P. Rogers, E. N. Harris, Frederick M. Robinson, C. G. Davis, D. F. Drake, J. E. Fish, D. P. Ingalls, E. S. Hathaway, N. A. Glover, Wilkes Allen, P. E. Burtchall, Edward A. Bryden, L. F. Jones, H. F. Russell. The report of the Committee on Operative Dentistry was read by Dr. G. T. Moffatt. This included a review of the improved instruments and processes for the performance of dental operations; also remarks upon

several medicinal preparations for dental treatment. A discussion upon cases and operations in dentistry followed, in which several members gave the Society the benefit of personal observations. After this there was a brief discussion upon the mechanical appliances and instruments for dental operations. Dr. L. D. Shepard submitted a report on Dental Literature, in which the reading of dental prints, and the practice of what is there to be learned, were urged. A. M. Dudley, of Peabody, submitted a verbal report on Dental Medicines, which was discussed briefly. There were also brief discussions upon other subjects connected with the profession, and the meeting adjourned to 9 o'clock, Friday morning.

SECOND DAY'S PROCEEDINGS.

The Society reassembled in the Meionaon, at half-past 9 o'clock, the Vice-President, Dr. S. J. McDougall, in the chair. The first business before the meeting was the report of the Committee on Dental Pathology, which was presented by Dr. Hurlburt. The report was listened to with the closest attention, as containing many matters of deep professional interest.

On the invitation of the Chairman, Dr. Clough adressed the meeting briefly, speaking of the great progress made in dentistry of late, of which his own experience had convinced him. He had, during the past few years, been remarkably successful in restoring dead teeth, and had confined himself to the use of carbolic acid and creosote, with which he had been so successful as to prevent his trying other agents. The discussion which followed possessed much professional interest. A voluntary essay was presented by Dr. Hawes, of Boston, in which he expressed the opinion that many of the terrible and apparently unaccountably sudden cases of decay of teeth in females were traceable to inter-uterine disturbances. He said he had come to the conclusion that the abnormal condition of the female pelvic organs, acting through the digestion, was responsible in a great measure for the marked decay of teeth in females, the cause of which had often baffled practitioners. At the conclusion of Dr. Hawes' essay, which was listened to with great attention by all present, as touching a question of vital importance not only to the profession, but to humanity generally, the subject of Dental Pathology was laid upon the table. Dr. Kidder, from the Committee on Dental Appliances, made a verbal report, in which he spoke of a case in his own observation, in which he had used hard steel as a substitute for gold in capping molar teeth, as the last-mentioned material was liable to wear away rapidly under the collision of the teeth. The subject of Den-

tal Pathology was then taken from the table, and Dr. T. B. Hitchcock read a paper on the syphilitic deformity of the teeth and mouth. Dr. E. G. Leach followed on the same subject as Dr. Hawes, speaking in the same strain. Dr. T. B. Hitchcock offered the report of the Committee on Histology and Microscopy, which was an interesting paper and attracted much attention. The report was illustrated by the exhibition of specimens and photographs showing the masticating organs in various conditions. Dr. Drake spoke in defense and advocacy of the practice of transplanting teeth, of the utility and feasibility of which his experience had convinced him. The discussion which followed was very interesting, and was participated in by Drs. Leach, Harriman and others. The subject of Dental Education was then taken up, Dr. E. Blake presenting the report of the committee on the subject, and urging more thorough training in the more mechanical branches of the profession, and making various suggestions for the improvement of the present methods of dental education. Dr. Smith, of Taunton, read an able and interesting essay, urging the importance of the dentist, and the necessity for thorough preparation on his part for his duties. The Auditing Committee reported that they had examined the Treasurer's report and found it correct, and it was accepted. A ballot was next taken for President, and Dr. G. T. Moffatt was elected, receiving a large majority of the votes cast. He accepted the office with a few well-worded remarks. The meeting then proceeded to the election of the remaining officers, with the following result: First Vice-President, S. J. McDougal; Second Vice-President, J. S. Hurlburt, Springfield; Recording Secretary, Charles Wilson; Corresponding Secretary, A. A. Cooke, Milford; Treasurer, Edward Page, Charlestown; Librarian, Dr. G. F. Grant; Microscopist, T. B. Hitchcock, Boston; Executive Committee, N. W. Hawes, Boston; E. Page, Charlestown; L. C. Taylor, Holyoke; J. F. Adams, Worcester; S. F. Ham, Boston.

TONGUELESS SPEECH.

The reputed miracle wrought in the case of the African Bishops and certain other Christian martyrs, who retained the power of speech after having their tongues cut out, has lately been the subject of a somewhat heated controversy. The fact of their being able to speak after they had lost their tongues was not questioned; it was only claimed that there was no miracle in the matter, or anything to warrant the inference of Divine

interposition because of their peculiar sanctity. They may have been most worthy characters, but their tongueless speech was no proof of such a fact, since the same phenomenon had been observed where there could be no claim to saintliness.

An interesting illustration of the truth of the latter position has just occurred in the Royal Free Hospital in London, the case being reported in the *Lancet* for November 8. To remove a cancerous ulcer, a patient's tongue was wholly cut out, leaving the floor of the mouth entire. Recovery was rapid, and within a week the patient could speak with sufficient distinctness of articulation to make himself understood, saying: "I feel easy," and "I should like some more beef tea."

[*Scientific American.*

DEATH IN A DENTIST'S OFFICE.

We offer no apology for the insertion of the following somewhat lengthy report of the proceedings before the coroner in the case of the sudden death of Mrs. Mary F. Crie, of Boston.

The importance to dentists, of all possible information upon such cases, is apparent. We are indebted to that excellent weekly, the *Boston Medical and Surgical Journal*, for the report.

The announcement in the morning papers of November 11th, that on the previous day the death of a lady by ether had occurred in the practice of Dr. Eastham, a dentist in this city, caused much excitement in professional circles. The death had taken place about noon, but very few, except those particularly interested, were aware of it till the next day. The coroner, Dr. Ainsworth, who was called in directly after the accident, formed a jury of physicians and apothecaries, and ordered an autopsy. This was made the next morning by Dr. R. H. Fitz, Pathologist to the Massachusetts General Hospital, and on the same day the jury met, and, having viewed the body, adjourned till the 14th.

On Nov. 14th, the first witness was Dr Edson, who testified that he had twice attended Mrs. Crie, the deceased, during her confinements, but had never given her an anæsthetic, though she had desired it. This was owing to his disapproval of anæsthetics during labor, except in rare cases. He would have given one to the deceased as readily as to any patient in her case.

Dr. Fitz was next called, and read the following account of the autopsy:

Examination made twenty-one hours after death. Body preserved in ice; rigidity well marked; no discoloration of face or anterior portions of the body; skull-cap and dura-mater normal; longitudinal veins empty; moderate amount of blood in the veins of the arachnoid; nothing abnormal observed at the base of the brain. The blood-vessels in this region contained but little blood; cerebral substance firm, containing much less blood than usual, not particularly moist; absence of any anatomical changes; ventricles apparently normal. Pericardium healthy. Heart moderately contracted, unusually small, and of usual color; aorta of less than the normal calibre, walls unusually thin and elastic; cavities of the heart contained dark fluid blood, of no unusual odor or color; right side of the heart contained more blood than the left; valves healthy, muscular substance apparently normal. Pleural cavities healthy, containing a small amount of reddish fluid. Lungs of a bluish-red color, the posterior dependent portions quite dark; tissue contained air and a somewhat increased amount of blood; absence of any special degree of œdema; in upper lobes of both lungs a rare, small, cheesy nodule. The larynx, trachea, bronchial tubes and the larger vessels at the root of the lungs free from changes. Spleen of normal size and firmness, the color dark blue. Kidneys unusually firm, capsule rather more adherent than usual; in sections, the organ was of a grayish slate color; blood-vessels, including the malpighian organs, unusually distinct from the presence of blood; tubular structure apparently healthy. Bladder healthy. Uterus and ovaries well developed; an old *corpus luteum* present; the lining membrane of the body of the uterus unusually injected, covered with a viscid, bloody fluid. Liver of normal size, dark color, containing rather more blood than usual, otherwise healthy; stomach and intestines presented no unusual appearances.

The anatomical examination gave no evidence of recent disease of any of the organs, or of chronic alterations sufficient to account for death; the fluid conditions of the blood, the diminished amount in the brain and the increased amount in the thoracic and abdominal organs were abnormal, and might have been the result of various causes; the diminished size of the heart and of the aorta were probably of congenital origin.

Q. Do you consider the absence of blood in the brain and cerebral cavities as abnormal? A. Yes, sir.

Q. Do you ever find the blood liquid so long after death, except where chloroform is used? A. Yes, sir; it is so in any case of death from asphyxia, in cases of poison from certain gases, and in cases of

some very malignant forms of disease where decomposition is very rapid.

Q. I suppose a perfectly healthy woman would not be likely to have this sudden change take place in her without some cause similar to those you have mentioned? A. Very unlikely.

Dr. Eastham then testified that he graduated in medicine in 1841, had practiced dentistry nearly all the time since, and had used anæsthetics from their introduction. The deceased had been his patient for twelve or fourteen years, during which he had on several occasions given her anæsthetics, chloroform, ether and gas, both severally and in combination. The deceased came to his office in the forenoon of the 10th, and there met Mrs. Sawyer, whose tooth he extracted after giving nitrous oxide. Mrs. Sawyer urged the deceased to take gas, but she insisted upon ether. He made a mixture of a little *chloroform and ether.*

Q. You made a mixture at the time? A. Yes, sir; I usually do that way.

Q. Please tell whether or not on this occasion you measured the quantity? A. No. I have been so familiar with it that I usually guess at the proportion. I never measure it. I always calculate to have more ether than chloroform.

Q. How much of this mixture did you make? A. Not more than an ounce or an ounce and a half.

Q. How did you administer it? A. I always administer it on a sponge. I always drop the window at the top, so as to have fresh air. I pour onto this sponge (it is a hollow one about the bigness of my two hands) about a big teaspoonful, as near as I can judge.

Q. That would have been about a third of the mixture? A. No, not so much as that. I always begin gradually in applying it, first holding the sponge a little distance from the nose, and then moving it nearer. As she began to breathe it, she says, "Give me enough this time, sure." This she repeated three times. I did not fully etherize her, nor did I intend to. After she had breathed two or three minutes, I said to her, "I am going to take this tooth out." She shook her head, as much as to say she was not ready, but I took hold of the tooth. She straightened back, groaned and screamed a little, as if in pain. After I had pulled the tooth, she went back into a sort of hysterics, and became rigid, as if in spasms.

Q. At this point in the case, did you notice her lips, whether they were pale? A. Not much.

Q. Any change in her countenance? A. Not much.

Q. Did you notice her eyes? A. They were set wide open, like one in a spasm.

Q. You did not notice whether there was anything particular about the lips? A. No.

Q. Did you try the pulse at that time? No. I seized a napkin, moistened with water, and gave her a splash on the forehead. She seemed to revive, and I saw a flush of color come over her face. I set her up and took my ammonia water and applied that to her nose; then I spoke to Mrs. Sawyer. Mrs. Crie was sitting up in the chair, inclined a little forward at that time, and I was applying ammonia and water to the face. Mrs. Sawyer came in, and I asked her to loosen her dress, which she did. Then I saw a change again, back to paleness, and I said, "Call the other doctors." Dr Osgood arrived first. We unloosed Mrs. Crie's corsets. Dr. Osgood rubbed her spine, and I sent the porter after another physician. We continued to rub her and apply very strong ammonia, and, finally, after Dr. Lamson came in, we removed her to the large room, and, raising her arms, tried in every way to set up a respiration. We sent for a battery and used that. We worked over her till we all came to the conclusion that she was past restoration.

Q. Can you tell us how long after she fell back into this spasm it was before respiration ceased? A. I should say about fifteen minutes.

Q. How long did the flush continue? A. It might have been two minutes.

Q. Then, as I understand, she fell back at once? A. As soon as the shade went back, I called for help. After administering these anæsthetics, there are two peculiar shades. There is the shade for faintness, and a shade from sickness at the stomach, and they are perfectly distinct.

Q. What was your opinion of this peculiar shade then? A. I thought it was a pallor from faintness.

Q. From the time she had this spasm and during the time you were administering the ammonia, was she sitting up in the chair? A. Yes, sir; but after the doctors came in they removed her to the waiting-room and laid her down.

Q. Was she breathing then? A. She was dead.

Q. How long had you begun the administration of ether before you extracted the tooth? A. About a minute or a minute and a half.

Q. During that time did you feel no pulse? A. Never do that. Always watch the side of the head, the temporal artery.

Q. Do you think there is any danger of death occurring from giving

ether alone? A. I never had anything that appeared like it myself: nor in chloroform.

Q. You have not considered, then, that there was any danger? A. No, I do not—that is, unless you administer it as they do in England. I should think they would kill every other one, by using a napkin as they do. But if chloroform be given as I give it, on a sponge, with plenty of fresh air, I don't consider it any more dangerous than ether; but a person must discriminate between individuals, whether he would give ether, or gas, or chloroform, or anything, and these things must be learned by practice.

Q. You considered her to be a person lacking somewhat in vitality, and therefore you didn't choose to put her fully under the influence of it (the anæsthetic)? A. Yes, sir.

Q. Do you consider either of these anæsthetics more dangerous than the others? A. I suppose chloroform would decompose blood quicker than ether.

Q. Do you know of any difference in chloroform? A. I have never used but one kind—Squibb's.

Q. In what way do you keep it? A. Always in a dark closet, and corked as tight as I can.

Q. Do you know of any difference in the quality of ether? A. No, only from the seller's opinion of it. I use Powers and Weightman's concentrated.

Q. How much of this mixture did you generally make at a time? A. Not more than a couple of ounces at once.

Q. What was the proportion of chloroform that you generally intended to have in? A. Less than half, by volume.

Q. Did you keep that mixture a long time? A. No, but I would most always add more ether if it had been standing a little while.

Q. Did you state that you made this mixture you administered to Mrs. Crie that day? A. I had a little in a bottle, and I added more to it before I gave it to her. I had used it a week before.

Q. What is your reason for adding in chloroform to the ether? A. Well, I think it is safer. Ether is a great stimulant, and when you have a little chloroform, the patients are not so noisy or excited as they are under pure ether. That is my reason, not that I feared one or the other.

Q. You would not hesitate to give any quantity of chloroform? A. No, sir. If amputation was to be performed I had as soon use chloroform as ether.

Q. On the whole, which anæsthetic do you consider the most safe? A. I think I should use ether for safety. Ether and chloroform combined, in my idea, is much better than either of them alone.

Q. Do you feel any anxiety when about to administer chloroform, or ether, or the mixture? A. No.

We have said that we should make no comments on the evidence while the investigation is in progress, but we may without indiscretion express our gratification at Dr. Ainsworth's course in giving the affair a thorough and public examination. This should be done in every case of death from anæsthesia.

Dr. G. H. B. Flagg.

Dr. G. H. B. Flagg is a dentist in Boston. He was in Dr. Eastham's room while Mrs. Crie was dying. He felt her pulse; it was very slow, not more than twenty-five, and feeble, and to him it was apparent that she could not live.

Q. Have you been in the habit of giving chloroform yourself? A. No, sir.

Q. Either purely or combined with ether? A. Four times in the last ten years I have given a mixture of chloroform and ether.

Dr. Flagg said that he preferred not to give chloroform, but did not know enough about it to say it was dangerous.

Q. Were you in the habit of giving gas to Dr. Eastham's patients? A. I usually assisted him.

Q. And he has given ether to your patients? A. Four times, sir, during the last ten years.

Q. Then when you stated you had administered chloroform, you meant it had been administered by Dr. Eastham? A. Yes, sir.

Q. You knew it was the mixture of chloroform and ether? A. Yes, sir.

Dr. H. D. Osgood.

Q. You are a practicing dentist? A. Yes, sir.

Q. You were called into Dr. Eastham's office between eleven and twelve o'clock on Monday, Nov. 10th? A. Yes, sir.

Q. Will you state to the jury what you saw there? A. Mrs. Sawyer came into my room at that time and said that Dr. Eastham wanted to see me, for a lady who had taken ether had fainted.

Q. Did she mean ether, or chloroform, or a mixture? A. I don't know; she said ether. I went into his office, and saw a lady in the operating chair.

Q. What was her position? A. She was inclined forwards. She seemed very low. I examined her pulse, and could not detect any at all.

Q. Did you detect any respiration? A. No, sir, I did not. Examining her clothing, I found she had on corsets, and that they were quite tightly laced. We applied ammonia and water, and Dr. Eastham slapped her face vigorously with a towel.

Q. Did she at all revive in any way? A. Not to my knowledge.

Q. You could not feel any pulse or detect respiration. Do you think she was dead? A. It was my opinion that she was dead.

Q. That was when you first went in, soon after Mrs. Sawyer called you? A. Yes, sir.

Q. Dr. Osgood, you have been for a long time practicing dentistry? A. Yes, sir.

Q. You have been in the habit of giving ether? A. Yes, sir.

Q. Have you been in the habit of giving ether and chloroform? A. Yes, sir.

Q. Do you consider, from the experience you have had in the use of it, that chloroform is safe, either alone or combined with ether or alcohol? A. I consider it so, or I should not have used it.

Q. Do you give it alone? A. Yes, sir, I have done so many times.

Q. Have you given the mixture? A. Yes, sir.

Q. In what proportions? A. One-third chloroform and two-thirds ether.

Q. Has Dr. Eastham given it for you? A. Yes, sir.

Q. You always knew it was ether and chloroform? A. Yes, sir.

Q. Did the patient know it? A. I could not say.

Q. What did they call for? A. I don't know, sir.

Q. They must have required an anæsthetic, or you would not have given it? A. True.

Q. Did they call it an anæsthetic? A. No, sir.

Q. What did they ask for? A. I cannot tell, sir. I think quite likely they called for ether.

Q. Did they ever call for chloroform? A. Yes, sir, very often.

Q. When they called for chloroform, did you give them the mixture? A. I may not have given them either, but the gas instead. We never give ether or chloroform when we can get them to inhale gas instead. Sometimes one demands either ether or chloroform, and then we give it to him.

Q. You give the mixture when they call for the ether or chloroform A. Yes, sir.

Q. Have you ever seen any ill effects from ether and chloroform mixed? A. No, sir.

Q. The uniform strength has been about one-third chloroform? A. Yes, sir.

Q. By weight? A. No, sir, by bulk. I never considered it a very great matter whether one-third, a little more, or a little less.

Q. Do you give anæsthetics now as much as you did ten years ago? A. Do you mean ether, and chloroform, and nitrous oxide?

Q. Yes. A. I do a great deal more.

Q. Is the use of ether and chloroform on the increase or decrease with you? A. I don't give as much as I formerly did.

Dr. E. S. Wood.

Dr. E. S. Wood, acting professor of chemistry at the Harvard Medical School, gave the following account of his analysis:

I received a small, glass-stoppered vial containing liquid; a portion of a liver, a spleen and kidney, and the contents of a stomach. The vial contained 1.39 ounces. The odor of the liquid resembled that of ether mixed with chloroform, the odor of chloroform being strongly perceptible. The specific gravity of the fluid = 1.043, which corresponds to that of a mixture of six parts by bulk of ether with four of chloroform, if allowance be made for an increase in the density of the two when mixed. A mixture of sixty per cent. of ether with forty of chloroform had a specific gravity of exactly 1.043 at 68 degrees Fahr., and had lost about $\frac{1}{100}$ of its volume. A mixture of sixty parts ether with forty chloroform will not occupy one hundred parts by volume, but only 98.945 parts, and its specific gravity, instead of being 1.032, as if no condensation took place, will be 1.043. The mixture contained no hydrochloric or acetic acids and no chlorine, showing that both the ether and chloroform were free from any deleterious impurity, a small amount of alcohol only existing as an impurity. The liquid answered the tests both for chloroform and ether. By bulk, it was sixty per cent. ether and forty per cent. chloroform, and by weight 58.14 per cent. ether and 41.86 per cent. chloroform. The blood had no odor, either of chloroform or ether, and neither of these liquids was detected by analysis: and the same is true of the organs, which were carefully analyzed.

Q. You are somewhat familiar with statistics of anæsthetics, are you not? A. I have seen some statistics.

Q. Have you it in your power to tell the jury the statistics relative to

the mortality occasioned by the use of ether or chloroform, or a mixture of the two? A. The only statistics which I have seen were some which were published in Chicago in 1870, and these were reprinted, or rather copied into the last annual report on the practice of pharmacy and toxicology.

Q. Will you please state what these were? A. Roughly, the proportion of deaths to cases in ether was one in twenty-five thousand; to cases in chloroform, one in twenty-five hundred; to cases of a mixture of chloroform and ether, about one in five thousand.

Q. If you had been handed all the articles, without the chloroform and ether, could you have given any opinion as to the cause of the person's death? A. No, sir.

Q. Did I understand you that there were no odors in the blood? A. Yes, sir. The blood was strongly alkaline.

Q. What do you think is the smallest amount of chloroform that would cause death? A. The smallest reported, as I remember, was from fifteen to twenty drops by inhalation; one drachm taken by the mouth into the stomach, and one drachm of a mixture containing one part chloroform to four of ether by bulk; that is, one teaspoonful.

Q. You mean that dose has caused death? A. Yes, sir, immediately; that is, within a few minutes.

Q. Is there any record of the presence of any poison in the blood of any of these cases reported? A. It has sometimes, but rarely, been possible to detect chloroform in the blood. The analyses after death from ether, in case of animals, have been unsatisfactory, and in case of death from chloroform it is only sometimes possible to detect it.

Q. Have you any idea of the cause of absence of coagulation in the blood? A. No, sir. The spectroscopic examination of the blood gave a normal appearance.

Dr. Henry J. Bigelow.

Q. You have heard the testimony in this case; you have it under oath that this lady had breathed from two to four drachms of a mixture of ether and chloroform such as you have heard stated; now what is your opinion as to the cause of death? A. She died of breathing chloroform; there is no question about it.

Q. You have no doubt that the chloroform which was used in that mixture was the cause of death? A. It was the cause of death.

Q. She took about two-fifths chloroform and three-fifths ether according to bulk; would that amount of ether be sufficient to cause death? A. It would not possibly cause death.

Q. Would it be safe for a child six years old? A. I cannot conceive that it would effect it deleteriously.

Q. Two-fifths chloroform? A. Might kill an adult.

Q. Have you ever in your experience known of any deaths by chloroform? A. I have been present at but one.

Q. You are familiar with the literature on that subject. From your reading, how many cases are you prepared to answer for? A. I am wholly unable to give a number. They are numbered by hundreds, and it is proved that many are not reported.

Q. Have you ever known of a case of death from ether properly administered? A. No, sir.

Q. Do you, from your own knowledge or by reading, believe there ever was a case of death from ether properly administered? A. There is a fallacy in the proposition put in that way. Ether is a powerful agent, and if a man is feeble or dying, it would contribute to his death like a dose of opium or anything else that has weight, and force, and power in it. But that is not the real question as between ether and chloroform, for both of them are powerful agents. The real question is, has chloroform, besides this narcotic power, some very poisonous influence which acts upon the system and in which it differs from ether—has chloroform such a power, has ether, or have both? I answer, chloroform has and ether has not: chloroform kills suddenly and ether cannot.

Dr. S. Cabot.

Q. As a result of your experience, do you think it dangerous in any way to give ether by inhalation? A. I don't, sir, with, of course, proper precautions.

Q. From your knowledge and personal experience, do you consider it safe to give chloroform? A. No, sir, I do not.

Q. Even properly, with all precautions possible to be taken? A. I don't think it safe.

Q. Judging from your knowledge, what do you think caused the death of Mrs. Crie? A. Inhalation of chloroform.

Q. Do you think that two-fifths of a tablespoonful of chloroform, as taken by bulk, would be sufficient to produce that effect? A. I do, sir.

Q. In your judgment, can a person in ordinary good health take ether enough to produce death, say in the course of ten or fifteen minutes? A. No, sir.

Drs. Henry G. Clark, George H. Gay and R. M. Hodges testified to the same effect. On the next evening, the jury met again, and presented the following verdict:

That Mary F. Crie came to her death on Monday, the 10th day of November, 1873, between eleven A.M. and one P.M., in the office of Dr. Charles Eastham, a dentist, No. 25 Tremont street, Boston, and that her death was caused by the inhalation of chloroform administered in a mixture of chloroform and ether by the said Dr. Eastham. The jury use this opportunity to caution the public against the inhalation of so dangerous an agent as chloroform for the production of insensibility to pain. In the opinion of the jury, the inhalation of sulphuric ether is safe, while the inhalation of chloroform, either alone or mixed, is always attended with danger.

It was signed by Ezra Palmer, M.D., John A. Lamson, M.D., Geo. Fabyan, M.D., George Lotz, M.D., Thomas Resticaux, and Thomas Doliver.

This case has attracted much attention, not only from the attempt made just after the accident to pass the death off as one from ether, but also, when it became evident that it was due to chloroform, from anxiety to see what would be the conclusions of a Boston jury. The verdict is all that could be desired, as it expressed emphatically the feeling of the profession, and we do not find fault that Dr. Eastham was spared the well-deserved censure which he must have expected. The misfortunes of the past should be remembered only as warnings for the future. The use of chloroform is least justifiable where ether is best known; there is less excuse for its use in America than in Europe, and least of all in this city. After this verdict, nothing but very exceptional circumstances will warrant its administration. It appears in the evidence that several dentists are in the habit of giving whichever anæsthetic they see fit, regardless of the request of the patient. We hope that this custom is not general, and would advise any who may persist in it not to be too sure that after another patient, who shall have asked for ether, has been killed by chloroform, the verdict may not contain, besides other disagreeable words, the adjective "criminal."

SUIT AGAINST MR. S. S. WHITE.

As we go to press, we notice in the morning prints, a report that the Goodyear Dental Vulcanite Co. have sued Mr. S. S. White, of Philadelphia, for "maintenance," which is defined in the books as "intermeddling in a suit that no way belongs to one, by maintaining or assisting either party with money or otherwise to prosecute or defend it," and

have placed their damages at the enormous amount of $100,000. This whole rubber business, as managed, has long been infamous and in the highest degree unjust. We have not the slightest idea that the case can result in anything more than a source of annoyance to Mr. White, who is too busy to spare time to such a contest.

Mr. White has rendered the profession valuable assistance in this matter of opposition to the outrages annually committed under color of the Cummings Patent, and we trust will have the full support of the dental profession in his effort to prove the worthlessness of that patent.—Ed.

PRIZE ESSAYS.

In order that the Dental Miscellany may secure to its pages articles of the greatest excellence, upon subjects of cardinal interest to the Dental Profession, we propose to suggest such subjects from time to time during the ensuing year, and to offer prizes for the best essays upon each of them.

Among articles so offered as prizes, we will place :

A Morrison Dental Chair. A Morrison Engine.

A Morrison Bracket. A Suspension Engine.

A complete Liquid Nitrous Oxide Apparatus.

A set Palmer's Clamps. Engine Burs, Instrument Stands, etc., etc.

This will doubtless bring earnest, interesting, and practical articles to these pages, and will insure to subscribers a Journal that will certainly return them much more than the cost of a subscription. In this number we will offer two subjects for competitive essays.

First, For the best Essay upon "Burring Engines and their Uses," we offer as a prize, a Morrison Chair ($150), or an equivalent value in articles of our own manufacture, as may be chosen by the writer of the successful essay. (Products of gold, silver, or platinum excepted in the above and all like offers.)

Second, For the best Essay upon "Rubber Dam," we offer as a prize, a Morrison or a Suspension Engine ($60), or other goods of our manufacture to an equal value, at the option of the successful contestant.

CONDITIONS OF THE OFFER.

a. The articles on the Burring Engine are to be submitted to the Awarding Committee on the 10th day of March next. Those on Rubber Dam, on the 10th day of February next.

b. Each article shall contain not less matter than will fill three pages of the MISCELLANY, nor more than will fill eight pages.

c. Each article sent in for competition, should be in a large envelope, addressed

JOHNSTONS' DENTAL MISCELLANY,

812 Broadway,

"Rubber Dam Essay," or
Burring Engine Essay.

NEW YORK.

The Essay itself should be written on half sheets of paper, and on one side only. It should have a fictitious signature, and be accompanied by a sealed envelope, bearing on it the same fictitious name, and on a slip of paper inside, both the fictitious name and the real náme of the author. After the Prize Committee shall have decided on the best of the several articles sent to them, the Publishers will hand them the envelope bearing the fictitious signature of the article, which envelope they will open, and award the prize to the successful contestant. The other envelopes will not be passed out of the hands of the Publishers, or the names of the writers divulged.

d. If only a single article is submitted upon any of the subjects, or if those sent are of very inferior merit, the committee may award a prize, or withhold it, as they shall judge equitable.

e. All articles submitted for competition shall be returned by the committee to the Publishers, and shall belong to them for publication, or other disposition, as they judge best.

The Publishers will request three prominent practitioners of New York or vicinity to act as a Prize Essay Committee, for examination of articles upon each of the subjects for which prizes are offered.

JOHNSTON BROTHERS,

812 Broadway, N. Y.

(LETTER OF ADVICE TO A DENTIST.)

Friday, Sept 14.

Dear Sir:

Please let the bearer have the set you have repaired for me, and be kind enough to wrap them up securely, so that he may not hand them to me in my office before a crowd of persons, thus:

as he would be more than likely to do from the number of mistakes he makes. Also send the bill, which I will settle next week, about Wednesday.

Very truly yours, John Smith.

THE
Morrison Dental Chair.

Price, $150.00. Boxing, $5.00. Spittoon Attachment, $8.00.

It possesses great superiority over any chair before offered to the profession, and is at the same time less expensive than any other first-class chair. Some of its points of superiority we here enumerate:

1st. All the advantages of any low-based chair, and also of any high-based chair, are here secured in a single chair. In it the patient can be placed lower than in the lowest-based chair made, or higher than in any other of which we have knowledge. At its lowest position the seat is fifteen inches, and at its highest position forty-two inches above the floor.

2d. The operator using the Morrison Chair can either stand or sit at his work, as he may choose, working with equal convenience in either position.

3d. It has been a very general complaint that dental chairs are too wide at the back, so holding the operator away from his work. Here this difficulty is overcome. The chair is narrow at the back, so that the operator need not stretch to reach the patient, but *can lower either arm of the chair out of the way* and so be as near the patient as he may choose.

4th. It can be changed from its lowest to its highest position in seven seconds—a celerity impossible in any chair raised by a screw.

5th. It can be very readily and perfectly adapted to operations on children of any age.

First. Because in it the child can be raised as high as needed for the tallest operator.

Second. It provides a comfortable back and head rest, exactly as for grown persons.

Third. The footstool can be lengthened or shortened, to suit children of any size.

6th. The back of the chair can be lengthened or shortened rapidly and at will.

7th. The lower part of the back can be thrown forward to support the small of the patient's back.

8th. The chair, when adjusted to any position, is firm or steady wherever placed, and this is *especially true of the head-rest.*

9th. It occupies less room than any other operating chair.

10th. Although the footstool, when at its extreme length, is much longer than any other made, yet a person of ordinary weight can stand on its extremity without tipping the chair.

Nota Bene.—We have substituted brass cogs and castings, for those that experience has shown in any degree faulty, and the chair, *as now sold, is as strong as any chair made.* Reference is made to this because several of the chairs first sent out, failed in the cogs by which the chair is raised, and in the castings which throw the lower back-pad forward. These have been replaced in every instance with brass cogs, without charge on our part, and to the complete satisfaction of the purchaser.

We are gratified in being able to refer to the commendations, which follow, from some of the leading practitioners of the country.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

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10 W. 11*th St., New York, July* 24*th,* 1873.

MESSRS. JOHNSTON BROS., Broadway:

I find your Morrison Chair gives great satisfaction. My patients all admire, and voluntarily pronounce it the easiest they ever sat in. The movable back-piece, arms and foot-rest, which latter the patients can adjust at pleasure without changing their position, the lowering of the whole chair, which admits stepping into it without the slightest inconvenience, are points which call forth immediate praise from the patients, and give great satisfaction to the operator.

As a child's chair it is invaluable; the little patients can be "put just where you want them," while the operator can with ease change the position of the *whole* chair, without disturbing the patient in the least. These points, combined with others which it has, make this chair the most desirable of any which I have seen. Very respectfully yours, A. L. NORTHROP.

JOHNSTON BROS., *Hartford, June,* 15*th,* 1873.

GENTLEMEN: I have used the new Morrison Chair several hours every day since its arrival here, and feel in duty bound to say that there is no chair manufactured that can compare with it.

Its adaptability to children as well as adults, support for the small of the back—in fact, all its motions are perfect, and I see no chance for improvement. Dr. Morrison and yourselves have my heartfelt thanks for the great benefits you have conferred upon the profession in perfecting the chair as well as the Dental Engine. Very truly yours, GEO. L. PARMELE, M.D., D.M.D.

MESSRS. JOHNSTON BROS., *Hartford, July* 24*th,* 1873.

DEAR SIRS: The Morrison Chair meets all my expectations. I like it very much: in fact, I feel perfectly satisfied that I have one of the most complete chairs yet made for the comfort of patients and the convenience of the operator.

Yours truly, JAS. McMANUS.

JOHNSTON BROTHERS,

Dental Depot,

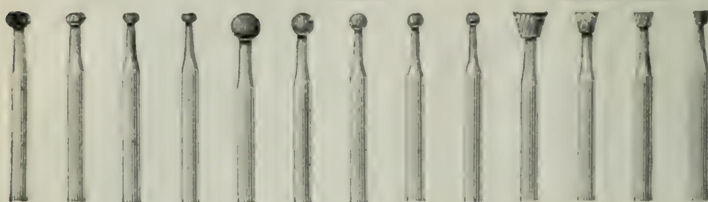
812 BROADWAY, NEW YORK.

Equipment for Morrison's Dental Engine.

PLUG FINISHING BURS.

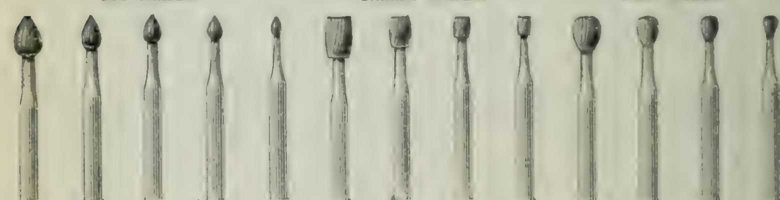
1

OVAL. ROUND. INVERTED CONE.



2 3 4 5 6 7 8 9 10 11 12 13 14

BUD SHAPED. BARREL SHAPED. PEAR SHAPED.



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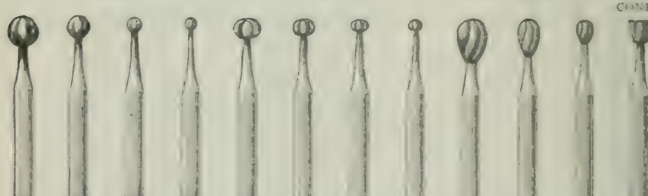
BURNISHERS.

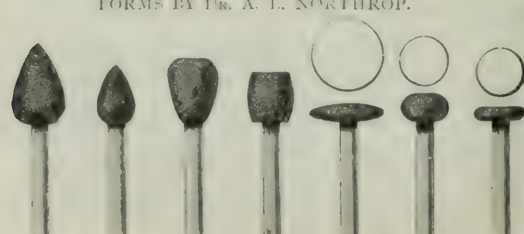
ROUND. OVAL. PEAR SHAPED. INVERTED CONE.



50 51 52 53 54 55 56 57 58 59 60 61

CORUNDUM POINTS FOR MORRISON ENGINE.

FORMS BY DR. A. L. NORTHROP.



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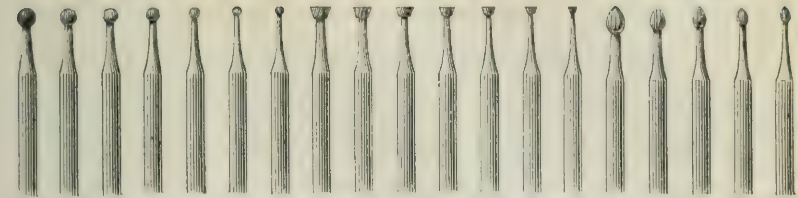
CAVITY INSTRUMENTS.

ROUND. INVERTED CONE. BUD SHAPED.



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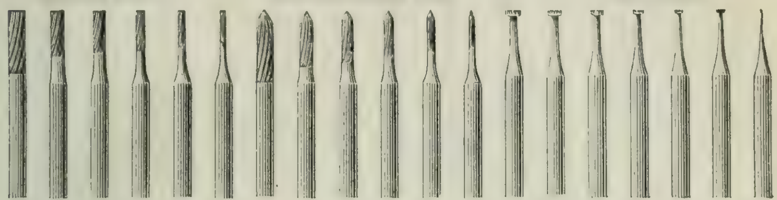
FISSURE BURS. POINTED FISSURE BURS. WHEEL BURS.



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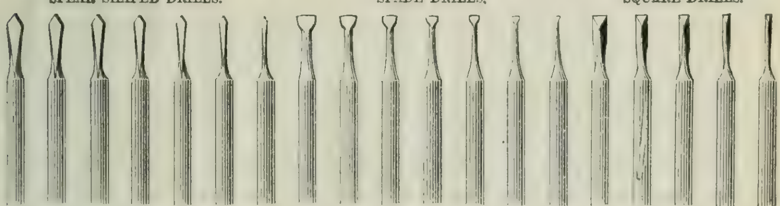
SPEAR SHAPED DRILLS. SPADE DRILLS. SQUARE DRILLS.



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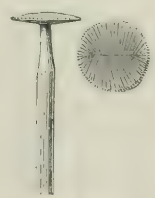
TWIST DRILLS.

219 220 221 222 223



Price, $1.25.

CAVITY INSTRUMENTS FOR RIGHT ANGLE ATTACHMENT.

We have in stock, and can furnish *Cavity Instruments* for the *Right Angle Attachment*, of all styles and sizes, from Nos. 100 to 218, inclusive.

SCOTCH STONES, MOUNTED.

The Scotch Stones enable the operator to give a finish to fillings hitherto unattainable, and only need a trial to be appreciated. We have these in stock of forms Nos. 75, 77, 80 and round. Other kinds of stones are now in process of manufacture.

HINDOOSTAN STONES, MOUNTED.

Forms of Nos. 75, 77, 80, and round. Of each shape we make three sizes. The cuts referred to by the numbers represent the large size. These are, beyond doubt, of the greatest utility in cutting either gold or bone. They last longer than any other stone.

LEATHERS, MOUNTED.

We have in stock Leather Points mounted on Mandrils, of forms Nos. 75, 77, 80 and round, designed to be charged with powders, for polishing and finishing fillings.

Screw Mandril, to be armed with leather, wood, etc., for polishing fillings, cleaning teeth, finishing plates, etc.

PRICES.

Finishing Burs,	Per dozen,	$6 00
Stoned Finishing Burs,	Each,	1 00
Cavity Instruments and Screw Mandril,	Per dozen,	3 00
Stoned Cavity Burs,	Each,	50
Right Angle Cavity Instruments,	Per dozen,	3 00
Leathers, Mounted,	"	3 00
Hindoostan Stones, Mounted,	"	6 00
Scotch Stones, Mounted,	"	3 60
Burnishers,	"	9 00
"	Each,	0 75
Corundum Points, Mounted,	Per dozen,	1 50
" " not Mounted,	"	0 75
Bands for Engine,	"	1 50

IN ORDERING INSTRUMENTS DESIGNATE THEM BY THEIR NUMBERS, AND STATE WHETHER THEY ARE WANTED TO FIT THE OLD OR NEW STYLE HAND PIECE.

Especial attention is called to our burnishers. They have been most cordially endorsed by our most prominent operators.

Purchasers of the new style improved hand piece will have all of their old stock of burs fitted to the new hand piece, free of charge, by sending them to us either by mail or express.

☞ Our instruments are all made of the best Stubs' steel. We shall spare no effort to make them equal in every respect to anything offered to the profession.

☞ We are constantly adding new forms and sizes of Plug Finishing Burs, Cavity Instruments, Drills, etc.

DIRECTIONS FOR USING THE ENGINE.

1. In lifting the engine, be sure *not to bend* the arm which carries the hand piece.

2. Whenever the least noise is heard, oil the engine with the best sperm oil. The rapidity of motion renders oil a necessity.

3. The only part at all likely to break, is the small spring, which conveys power at the upper end of the hand piece. It is not soldered to the shaft, but is slipped on by hand. To put on a new spring, take hold of it near the end opposite that you apply to the shaft, and twist as if to *uncoil* the spring, at the same time pushing the spring on to the shaft. You will be greatly aided in removing the broken parts, by twisting, as if to uncoil, the spring A piece of emory paper will be found convenient to aid in holding the polished shaft.

4. The engine, to run satisfactorily, should be oiled daily ; and the driving-spring should be perfectly straight.

IMPROVED INSTRUMENTS.

WE HAVE ADDED to our list three new and very popular sizes of Cavity Burs. One round called 106½, one inverted cone called 113½, one wheel-shaped called 137½. Each is smaller than any before made by us, of its shape. These numbers are neatly put up in dozen and half dozen packages, and are completely protected from oxidation and from rubbing against each other in transportation.

They are very popular, and we frequently receive orders from dentists for from one to three dozen of each.

STONED BURS for Burring Engines.—For some time past, we have made to order, a Bur for use in Burring Engines, by the following process: The teeth of the Bur being laid out with extreme accuracy, are filed to *exactly the same length*, but are not brought to a cutting edge. The Bur is now tempered, and each tooth *afterwards stoned to a fine edge*. This secures a Bur perfect in all its cutting edges, and unequaled by anything hitherto offered in the market. Of these we are provided with a limited supply, of both Cavity and Finishing Burs, excepting Fissure *Burs*. (See Price List.)

THIN BOXWOOD DISCS for carrying Polishing Powder, to polish fillings in proximal cavities. These are of four sizes, from ⅝ inch to 1 inch diameter.

WE ADD THAT THE INSTRUMENT-STAND, elsewhere illustrated, will be found very useful for the convenient keeping of the Engine Instruments while not in actual use.

Besides the form represented in the cut, we have them with smaller holes, and very many more of them, so that each Bur may be kept by itself.

WE INVITE the fullest examination of our Engine Instruments, as regards

The quality of the steel from which they are made.

The shape and finish of the cutting edge.

Their temper.

The rapidity with which they cut.

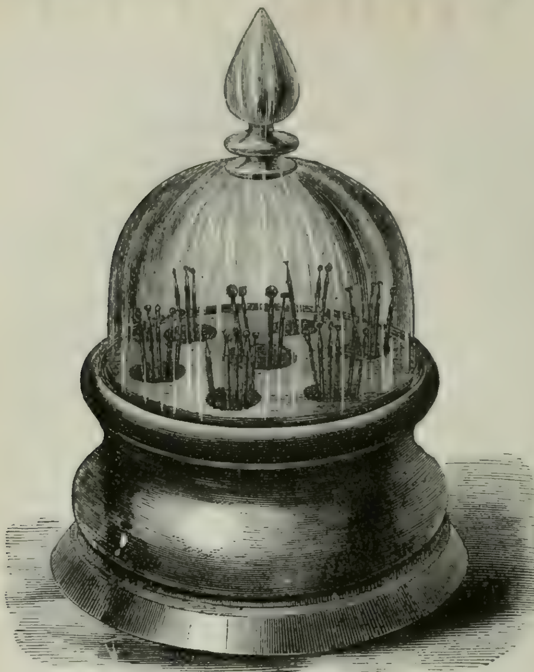
Their durability.

The shaft of each instrument is *round and highly finished*, and can therefore be used without unreasonable and unnecessary injury to the nose of the hand-piece, which injury occasions unsteadiness in all the uses of the Engine.

They will *bear* examination in *quality* and *price*.

JOHNSTON BROS.

INSTRUMENT STAND FOR ENGINE BURS.



Price, $2.50.

No. 1 as above. No. 2 with many more, but smaller holes.

This is made of rosewood and maple in alternate layers, and is very ornamental. Besides the form shown above, we have another like this in all respects except that the holes into which the burs are placed are made so small as to hold only one or two instruments in each. We call this No. 2.

JOHNSTON BROS.

CARVACROL. $C.^{20}$ $H.^{14}$ $O.^{2}$

HIGHLY RECOMMENDED.

PROPERTIES :—Locally applied, Carvacrol, in full strength or diluted, seems to possess antiseptic, disinfectant, sedative, mildly caustic and escharotic, gently styptic, stimulant, irritant and rubefacient properties.

Carvacrol, as a substitute for Glycerole of Thymol and Creosote or Carbolic Acid, in cases of Odontalgia, Sensitive Dentine, Alveolar Abscess, "Canker Patches," etc., may be locally employed in the same manner.

As a gargle for Tonsillitis and inflamed mucous membranes, it may be employed in the proportion of about three drops to the ounce of water, or the strength can be increased when more powerful action is required.

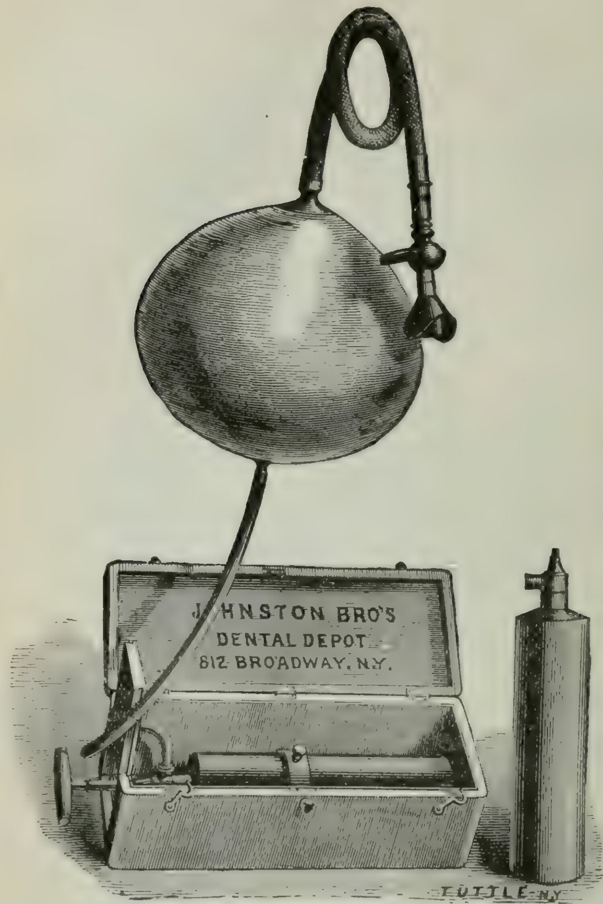
Price per Bottle, $1.00.

H. L. SAGE, D.D.S.

For Sale by JOHNSTON BROS.

SURGEONS' CASE.

LIQUID NITROUS OXIDE.



CYLINDER CONTAINS 100 GALLONS.

No. 1, complete.......................................$40.00

Boxing, $1.00.

No. 2, Surgeons' Case, with Extra Bag, and Improved Metallic Inhaler.......................................45.00

Boxing, $1.00.

REVISED PRICES.

Complete Apparatus—Surgeon's Case	$40 00
Complete Apparatus—Surgeon's Case, with extra Bag and Metallic Inhaler	45 00

Boxing either, $1.00.

Each complete apparatus includes a 100 gallon cylinder, filled with Liquid Nitrous Oxide.

Refilling Cylinder	$6 00
Morocco covered case, with ring and thumb screw, velvet lined,	12 00
Polished bl'k walnut " " " " "	13 00

Of these latter we have only a limited number.

Rubber Bag, with covered inhaler tubing, (about 4 gall. capacity)	5 00
Rubber Bag, with covered inhaler tubing, extra size	7 00
Inhaler, with spring valves, trumpet mouth-piece, with Plated connection	8 50
Inhaler, latest style, with two way stop cock, adapted to the use of both dentists and surgeons, with connection	9 50
Key, Nickel Plated	1 50
Wrench, "	50
Union, Nickel Plated, (nut and tube), for connecting cylinder and gas bag	1 50
Covered Inhaler Tubing, per foot	50

REMARKS.

When the side of a bag has been perforated, it cannot be repaired, but should be replaced. Send on the tubing by mail, and the bag will be replaced. Price............. 3 00

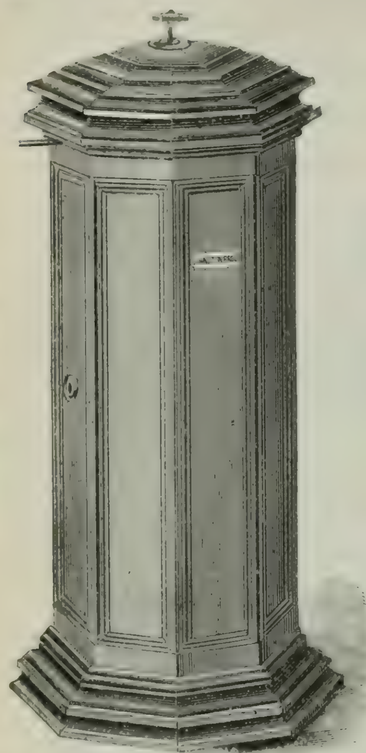
As this cannot be done *properly* except by the use of rubber cement, and by persons experienced in the business, we think it every way advisable that it be entrusted to the rubber workers, and not attempted by the dentist.

JOHNSTON BROS.,

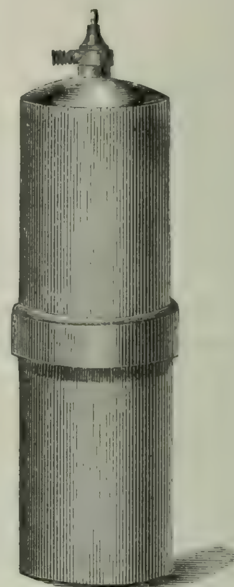
812 BROADWAY, N. Y.

ONE THOUSAND (1000) GALLONS GAS,

LIQUID NITROUS OXIDE.



1000 GALLON CYLINDER CASE.
Price, $30.00. Boxing, $2.00.



1000 GALLON
CYLINDER.
Price, $36.00.
Boxing, $1.50.

Gas in 1000 gallon lots, 4½ cents per gallon.

The above illustrated apparatus is especially desirable where large quantities of nitrous oxide are used, or where it must be sent a great distance. In this form it is best to ship it by *fast freight*—which makes the cost of transportation very light.

THE GAS CAN BE KEPT FOR ANY LENGTH OF TIME,

AND IS

CONSTANTLY ON HAND AND ALWAYS OF THE BEST QUALITY.

PRICE LIST OF A COMPLETE OUTFIT.

1 Black Walnut Paneled Case, octagonal	$30 00
2 1000 gallon Cylinders at $36 00	72 00
2000 gallons of Gas at 4½ cents per gallon, being 25 per cent. less than price in small cylinders	90 00
1 Bag, with covered Inhaler Tubing	5 00
1 Bag, extra size, with covered Inhaler Tubing	7 00
1 Key, Nickel Plated	1 50
1 Wrench, Nickel Plated	50
1 Union, " "	1 50
1 Inhaler—Metallic—with two way stop-cock and connection	9 50
	$217 00
Deduct Gas	90 00
Cost of Apparatus	$127 00

By purchasing under this plan a saving of 25 per cent. is effected in the cost of the gas, or on 2,000 gallons of $30.00.

It is right that we should here announce that we have in hand a piece of furniture, which—while it will answer the purpose of the black walnut case illustrated—will also serve as a stand for an ornamental Gasometer.

A cut of it will appear in an early issue of the DENTAL MISCELLANY.

As these large cylinders can easily be sent by fast freight (*the 100 gallon size is too small to be so risked*) cost of transportation is reduced to its lowest rate.

JOHNSTON BROTHERS,

812 Broadway, New York.

PORCELAIN TEETH.

Our stock is carefully selected from the factories of the BEST MAKERS, and embraces all of the varieties in use, including Continuous Gum Teeth. We will fill orders on short notice for any manufacture of teeth.

Dentists sending us their orders can rely on receiving prompt attention, and on getting manufacturers' best rates.

JOHNSTON BROTHERS.

DENTAL GUM—RED.

Johnston Bros.' Nos. 1 and 2, per lb	$2 50
E. Dougherty's Nos. 1 and 2, per lb	2 50
American Hard Rubber Company's, per lb	2 50
Whalebone Rubber, per lb	3 50
Dental Gum—black—per lb	3 00
Gutta Percha, per lb	3 00

JOHNSTON BROTHERS.

RUBBER DAM CLAMP FORCEPS.

Of these we offer two styles, both deservedly popular.

POINTS OF DR. T. C. ROYCE'S

Rubber Dam Clamp Forceps,

Shown with Clamp. Handles are exactly like the other style, (Bowman's.)

Both styles of these Forceps have points accurately adapted to the shape of the clamp at the neck, and hence will be found much more convenient than those hitherto offered the profession in this point of adaptation. (See also advertisement of Clamps.)

If so ordered we can supply either style of Forcep with a band, which will keep the Forcep and Clamp extended and ready for use when the hand of the operator is removed, as shown on the Bowman Forcep.

PRICES.

Forcep, either style	$3.00
" " " Nickel Plated	3.50
" " " " " with band	3.65
Complete set of Clamps, embracing eight forms	4.00
Complete set of Clamps, embracing eight forms, plated	4.80
Clamps, each	50
" " plated	60

JOHNSTON BROS.

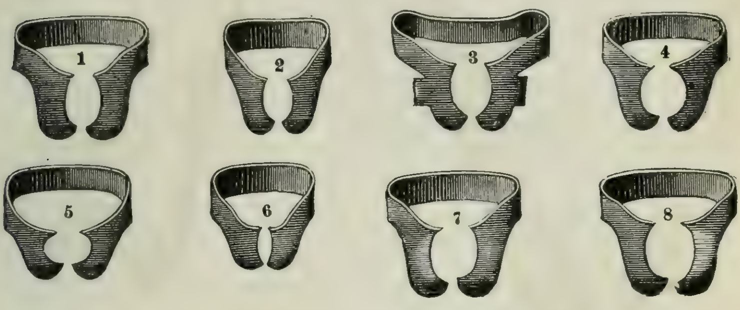
We were never more sure of doing signal service to the Dental Profession than now in offering the

IMPROVED

Rubber Dam Clamps,

INVENTION OF

DR. DELOS PALMER, OF NEW YORK.



Price, set of Eight,	Oil finish, $4.00.	Each plain,	50 Cents.
	Nickel plated, 4.80.	" Nickeled,	60

For use with Rubber Dam Clamp Forceps.

These Clamps are designed to be placed on the tooth at the commencement of the operation. Afterwards apply the Rubber Dam by passing it over both tooth and clamp.

DESCRIPTION.

Nos. 1 and 2.—Universal Clamp for Molars.

No. 3.—For posterior cavities in molars standing alone.

No. 4.—For third molars, or any molar of a cone shape. This Clamp can oftentimes be turned around while on the tooth, so as to place the bow of the Clamp out of the way of the operator.

No. 5.—For biscuspeds.

No. 6.—For lateral and central incisors.

Nos. 7 and 8.—Rights and Lefts.—For cavities under the gum, on the buccal or lingual surface of molars.

Cuts of two favorite styles of Rubber Dam Clamp Forceps will be found on another page.

These Clamps have prominent points of marked superiority over those of other manufacturers.

First. Each has been carefully adapted to the shape of the tooth for which it is designed, *under the personal supervision of Dr. Delos Palmer*, the inventor.

Second. A groove is made by us in the clamp, into which the forcep nicely fits, so that the clamps firmly hold their position on the forceps, when once adjusted, instead of tilting from one position to another—as is the case when no groove is provided.

JOHNSTON BROS.

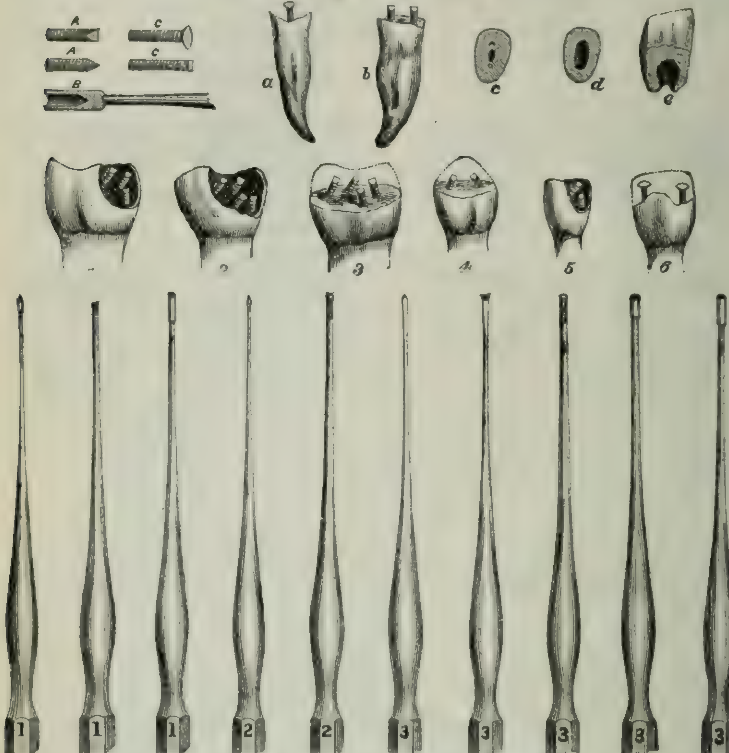
JOHNSTON BROTHERS,

SOLE AGENTS FOR

C. H. MACK'S

Improved Method of Securing Dental Fillings.

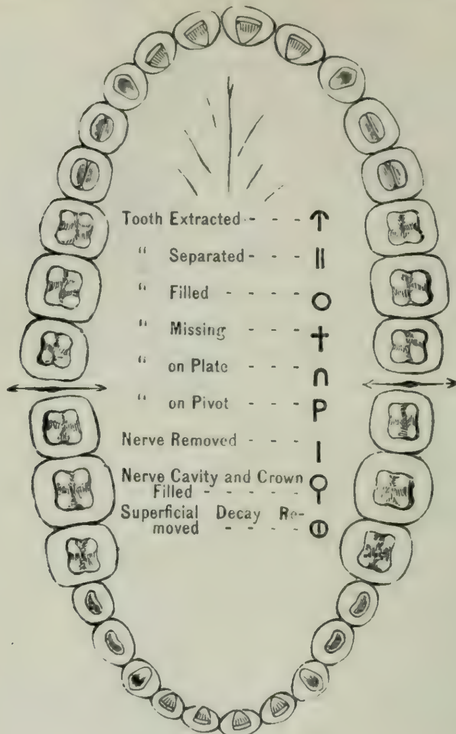
Patented May 2d and August 8th, 1871.



Figs. *A* and *A* represent the retaining screws magnified three times.
Fig. *B* shows Vertical Section of Socket Wrench for Inserting the Screws.
Figs. *C* and *C*, Screws with oblong heads.
Figs. 1, 2, 3, 4, 5 and 6 are suggestive cases for application of Retaining Screws.
Figs. *a*, *b* and *c* are front, side and end views of the Natural Root, with screws inserted, ready to receive Improved Tooth Crown. Fig. *d* is end view of Tooth Crown, and *e* is sectional view of same, showing undercut or chambered mortice. In representing the ten instruments, 1, 1, 1, are a drill, a tap and wrench of smallest size. 2, 2, drill and tap of middle size. 3, 3, 3, 3, 3, drills, tap and long and short wrenches of No. 3, or largest size.

This invention furnishes at once a positive and permanent anchorage for fillings or grafts in all cases, without which the dentist might well consider his operations at least *doubtful*, and is a guaranty for most perfect success and security when carefully applied. *It consists of* CONTINUOUS screws of gold, so alloyed and manipulated as to possess great strength and elasticity, and also of INSTRUMENTS for their introduction.

EXAMINATION TABLETS.



These are put up in Pads of 100 Each. Price 50 Cents.

Having this diagram of teeth on one side, and ruled for dollars and cents on the other, they will be found very convenient in making a diagram of any examination of a patient's mouth, or in sending to a parent an approximate estimate of the amount of work needed in a child's mouth.

JOHNSTON BROS.

HOUGHTON'S OS-ARTIFICIAL.

IMPROVED.

Its superior qualities are Extreme Toughness, Strength, Flint-like Hardness, and Insolubility after Hardening. Put up in glass stoppered bottles containing nearly ONE-HALF OUNCE. **Price $1.00.** Sent by mail.

CHAS. L. HOUGHTON, Brooklyn.

For Sale in any quantity by JOHNSTON BROS.

NEW YORK COLLEGE OF DENTISTRY,

EIGHTH ANNUAL SESSION,

1873-74.

FACULTY.

WM. H. ALLEN, Emeritus Professor of the Institutes of Dentistry.

FANEUIL D. WEISSE, M.D., Professor of Regional Anatomy and General Pathology.

FRANK ABBOTT, M.D., Professor of Operative Dentistry and Oral Surgery.

ALEX. W. STEIN, M.D., Professor of Histology, Visceral Anatomy, and Physiology.

F. LE ROY SATTERLEE, M.D., Professor of Chemistry, Materia Medica, and Therapeutics.

C. A. MARVIN, D.D.S., Professor of Mechanical Dentistry.

J. BOND LITTIG, D.D.S., Adjunct Professor of Mechanical Dentistry.

D. W. WILLIAMSON, D.D.S., Demonstrator of Operative Dentistry.

A. RUST CUYLER, D.D.S., Demonstrator of Mechanical Dentistry.

C. F. W. BODECKER, D.D.S., Assistant to the Professor of Chemistry, etc.

Students may matriculate at any time, as the Infirmary is open, for regular students of the College to practice in, the entire year.

The regular course of Lectures will commence middle of October, 1874, and continue until the 1st of March. Three hours of each day of the week (except Saturday) will be devoted to lectures, and four hours to *Clinics,* and practice at the Chair, and in the Laboratory, under the direction of the Demonstrators.

The Infirmary consists of two large rooms, each seventy-five feet in length, with an excellent light to operate by, furnished with operating chairs and tables, all arranged to the best advantage for the more perfect instruction of students. Patients are usually in attendance in great numbers.

Tickets for one year's Instruction, including Course of Lectures, Matriculation, Demonstrators', Diploma Fees, and Practice in the Infirmary the seven and one-half months between the sessions....	**$150.00**
For the Course of Lectures only...	**100.00**
Matriculation (paid but once)	**5.00**
Diploma Fees...	**30.00**

Board may be obtained for from $4 to $8 per week.

For further information, address

FRANK ABBOTT, M.D., Dean,
78 West Twelfth Street, New York.

HARVARD UNIVERSITY.

Dental Department.

BOSTON, MASS.

1873-74.

FACULTY.

CHARLES WILLIAM ELIOT, L.L.D., *President.*
OLIVER W. HOLMES, M.D., Professor of Anatomy.
HENRY J. BIGELOW, M.D., Professor of Surgery and Clinical Surgery.
THOMAS H. CHANDLER, D.M.D., Professor of Mechanical Dentistry.
THOMAS B. HITCHCOCK, M.D., D.M.D., Professor of Dental Pathology and Therapeutics.
GEORGE T. MOFFATT, M.D., D.M.D., Professor of Operative Dentistry.
NATHANIEL W. HAWES, Assistant Professor of Operative Dentistry.
LUTHER D. SHEPARD, D.D.S., Adjunct Professor of Operative Dentistry.
EDWARD S. WOOD, M.D., Assistant Professor of Chemistry.
HENRY P. BOWDITCH, M.D., Assistant Professor of Physiology.
EDWARD A. BOGUE, M.D., University Lecturer on Dental Pathology and Therapeutics.
IRA A. SALMON, D.D.S., University Lecturer on Operative Dentistry.
CHARLES B. PORTER, M.D., Demonstrator of Practical Anatomy.
CHARLES WILSON, D.M.D., Demonstrator in Charge.

Instruction is given during the Academic year, commencing on the 25th of September and continuing till the 24th of June, but is divided into two terms, attendance upon one of which is required for graduation, the other not. The first, or required term, begins September 25th and continues nineteen weeks. The second, or Spring term, which begins February 17th and ends June 24th, is designed to take the place of pupilage with private instructors, and affords better and more varied instruction than can possibly be obtained in any office.

The mode of instruction in the various departments is as follows, viz.:

ANATOMY.—Lectures, recitations and dissections under the direction of the Demonstrator of Anatomy.

PHYSIOLOGY.—Lectures, recitations and practical demonstrations in the Physiological Laboratory.

CHEMISTRY.—Lectures, recitations and practical work in the Chemical Laboratory, each student having his own desk and apparatus.

SURGERY.—Lectures, recitations, operations upon the cadaver, and clinical and operative surgery at the Massachusetts General and City Hospitals each week.

OPERATIVE DENTISTRY.—Lectures, operations at the Dental Infirmary of the Massachusetts General Hospital. There were upwards of five thousand operations performed during the last year.

MECHANICAL DENTISTRY.—Lectures and practical work in the Laboratory. The Infirmary provides an abundant supply of patients.

DENTAL PATHOLOGY AND THERAPEUTICS.—Lectures and recitations aided by specimens, models, diagrams and the microscope.

☞ The University Degree, D.M.D. (*Dentariæ Medicinæ Doctor*), is conferred upon those who fulfill the requirements.

FEES.

Matriculation, $5.00. Spring Session, $50.00. Winter Session, $110.00. For the Year, $150.00. Graduation, $30.00.

For further information address

T. B. HITCHCOCK, M.D., D.M.D., Dean,
222 Tremont Street, Boston, Mass.

JOHNSTONS'

Dental Miscellany.

VOL. I.——*FEBRUARY, 1874.*——NO. 2.

DENTAL EXAMINATION.

By W. A. BRONSON, M.D., New York.

It is proposed, in a brief paper, to speak of two matters incident to daily practice, namely : system and thoroughness in the examination of the mouths of patients. It is true, perhaps, that every one can perform his own duties best in his own way, but it is equally true that no class of specialists scan each other's methods, and pry into each other's peculiar ways, more curiously than dentists. A hint, therefore, upon subjects somewhat commonplace, may not be taken amiss.

An intelligent diagnosis of the condition of the mouth cannot well be had from a random examination, looking at a tooth here and there, and, after the whole have been gone over, ending in a confused and indistinct idea of what has been seen. Rather a point of departure should be taken. For instance, the upper right third molar, and from that examining every tooth in order, critically and perfectly, not permitting one to be passed till its entire condition is determined. Having thus examined, the case is more definite and better understood.

The necessity of absolute cleanliness of the mouth and teeth is being felt and insisted upon more and more, and it has become one of the first duties of the dentist to detect and point out to patients where and how they fall short of thoroughness, and to instruct them in such manipulations and habits as may be efficient. But to do this, the operator himself must know what absolute cleanliness is. Surprisingly few persons do know what it is, or how to secure it by the proper and necessary care.

Something like the following will be found to be the condition of almost every mouth. Commencing, for example, with the upper molars, around the necks of the teeth, and dipping in between them, will be found a soft deposit of promiscuous substances, of greater or less amount—too often greater. When it is quietly said that the brush has failed to do its work properly, the patient will look up with an expression of incredulity, and almost of injury.

A very short and convincing proof is easily made by passing a suitable instrument lightly around the teeth, removing the deposit, and the demonstration is not only convincing, but oftentimes lasting.

This is but one step in the investigation. The next is more hidden, but more essential, and at the same time more neglected.

Removing the more obvious deposit of which we have spoken, the margin of the gum will be found detached from the teeth, more or less congested, possibly discolored. A careful exploration will almost always detect a calcareous deposit just upon the border of the cementum, perhaps a mere line, and perhaps extending deeply upon the roots of the teeth. But whether there be more or less is not material as to the injury it may do, excepting in degree. Any at all is too much ; the least particle effectually preventing a healthy condition of the tissues. It is not necessary to say that the farthest limit of it must be reached, if a cure is expected.

The next search will be for whatever defects may exist in the teeth, either in formation or produced by caries, and in this, system and thoroughness are of the utmost importance, and the same order as has been urged in the preceding paragraph. A diagram should also be at hand, upon which to mark each imperfection as soon as detected.

There are, perhaps, no better instruments for the purpose of exploration, than very delicate and well-tempered excavators, small enough and strong enough to be turned firmly upon all surfaces and fissures, also floss silk for the purpose of cleaning and drying proximate surfaces.

Another aid in this service is a good magnifying glass, and the size most convenient to the hand and to the eye is two inches in diameter, and a focal length of two inches. Through this, when warmed so that the breath will not condense upon it, every part of the mouth can be readily seen.

Here also comes into use that greatest gift to modern dentistry—the Rubber Dam. With the perfect dryness secured by the dam, and the aid of a magnifying glass, it is scarcely possible to mistake the condition of any proximate surface or any fissure. Exceptional cases, of course, are presented, requiring the use of the wedge.

The foregoing method may seem to involve too much time, but the compensation is the accurate knowledge obtained, of the condition of the mouth, and the production of a diagram for a guide to future operations, without further search.

AMALGAMS.

As read before the New York Odontological Society, by E. A. Bogue, M.D.

The physical properties of amalgams are as yet but little understood; and we are glad to know that experiments upon them are now being made, both here and in England, which, we trust, will result in valuable additions to our knowledge.

Meanwhile, for information on this subject, we are obliged to rely mainly upon Watts' Chemical Dictionary ; and for information concerning amalgams for dental use, we are largely indebted to Messrs. Tomes and Fletcher, of England, and Cutler and Beers, of America.

The alloys for dental amalgams are various. Though mostly compounded of silver and tin, yet gold, platinum, palladium, cadmium, antimony and copper have been sparingly used.

Some of these metals combine with mercury easily ; others with difficulty.

Among the former are silver, gold, tin and cadmium. Among the latter, copper, palladium and platinum.

It may be well to observe, in passing, that copper combines with mercury by being precipitated upon it ; palladium readily, even violently assimilates with it, when in form of a precipitate, though very slowly in any other form ; and platinum enters into combination as platinum sponge, or in some alloys, though Dr. Cutler (*Can. Jour. Den. Sc.*, Sept. 1871, p. 324,) is not aware that this metal can amalgamate with mercury.

As to the character of these amalgams :

The copper amalgam, which is quite difficult to prepare, is dark in color, and its oxide is poisonous. Though extensively used in Germany, it is fortunately seldom or never employed in this country.

The palladium amalgam is quite as black as the copper, and cannot be used except in the form of a precipitate ; but it is not liable to more than superficial oxidation, and that entirely innoxious.

While most metals combined with mercury are supposed to constitute merely mechanical admixtures or solutions, palladium forms a true chemical union attended by the evolution of heat.

This amalgam is very highly esteemed in certain quarters in England; but its costliness, blackness and brittleness, however, prevent its being generally adopted.

The amalgams which have been most in favor in this country, have been, until within a few years past, composed principally of silver and tin.

Among these, however, are some that exhibit traces of other metals: such as Townsend's and Lawrence's, and perhaps a few others, which contain the copper that enters into the composition of the coin silver they use, and Holmes', which contains a small proportion of gold that is added to diminish the shrinkage.

Recently, through the researches of Messrs. Fletcher and Tomes, a new amalgam alloy has been introduced, which is composed of gold, platinum, silver and tin. The office of the silver is to harden; of the gold, to lessen contraction and oxidation; of the platinum, to hasten the setting and preserve the color. All these are essential points, and more essential in England, perhaps, than elsewhere, because an amalgam filling there, as a rule, receives its entire finish at the time of its insertion.

This filling hardens more rapidly than any other which has been in common use; and its contraction is less than that of any other *compound* filling whose contractions have been accurately measured.

As to the shrinkage: It has been thought by some, that the action of certain amalgams in the tooth, drawing together and rising toward the centre, was indicative of expansion. But it may be accounted for by the tendency of some metals to assume the form of a spheroid; and the amalgams which harden most slowly are especially inclined to this shape.

Besides, the experiments which have been made upon amalgams by the specific gravity test, have exhibited marked shrinkage.

According to a paper read by Mr. Tomes, before the Odontological Society of Great Britain, March 4th, 1872, the variation is from .037 of a unit in the case of palladium to .38 of a unit in the case of tin and silver used in equal parts; the shrinkage amounting to ten times more in the latter case than in the former.

The shrinkage of copper also is very little—scarcely greater than that of palladium.

It has been claimed, however, that the specific gravity test is not sufficiently accurate to measure the shrinkage of these substances: but a mechanical apparatus, constructed for the purpose of testing the very minute expansion and contraction of bodies, furnishes substantially the same results.

We wish now to speak of the practical use of amalgams. It is the general practice to combine the alloy with an excess of mercury ; afterward squeezing out the surplus mercury with the fingers or a pair of pliers.

As it is impossible to get rid of the mercury by this operation, since about twice the necessary quantity remains, leaving the amalgam hard and unworkable; the only proper course is to use the exact proportion necessary to the combination. Should a surplus of mercury at any time be found on the surface of an amalgam filling when the packing is finished, it can be tolerably well absorbed by slices of crystal gold, cut thin with a razor and laid upon the dry surface of the filling, until they are white with the mercury—when they are removed.

Dr. Cutler, in his experiments, took twenty-four grains of amalgam whose composition is not given, and having mixed, pressed, washed and weighed in the usual way, found that thirteen grains of mercury had been retained. Further on, in the same article, he states that twenty-four grains of coin filings took up thirty-two grains of mercury.

A red heat for twenty minutes drove off nearly all the mercury, but did not soften the lump, which remained hard and firm, though somewhat brittle. In these cases the proportions are not correct.

Now, if chemically pure silver and tin be combined in atomic proportions, silver 108, tin 118, (*vide* Fletcher on Amalgams—*Brit. Jour.*, 1872, p. 89,) twenty-four grains of the clean filings mixed with seven grains of mercury "will result in a powder, adhesive under pressure, which will not dissolve in alcohol, and therefore needs no washing, and which will weld up as solid as a coin.

This is a true amalgam, containing no free mercury ; in fact, there is great difficulty in separating a trace of mercury below a red heat."

But, of course, it is impossible to use a powder in the majority of cases.

But there is a filling which it is practicable to use in almost all circumstances ; viz., the ordinary silver and tin amalgam mentioned above, with the addition of ten per cent. of fine gold and sufficient platinum to insure rapid setting.

If to twelve grains of alloy four or five grains of mercury be added, and the resulting compound be carefully packed, without washing, into the cavity, little by little, with small points, warmed, if necessary, and finished up by repeated burnishing; the result will be a more perfect filling than can be procured by ordinary means, and that, too, with a compound containing little or no free mercury.

From what has been said, it will be seen that the term amalgam has been applied indiscriminately to almost all sorts of compounds; more than two hundred of which have been tested in order to ascertain their physical properties, and adaptability to dental purposes.

And it is desirable, in the circumstances, that much more should be known in regard to these compounds, before they be generally adopted or rejected by the profession.

TREATMENT OF FRACTURES.

A CASE OF COMPOUND FRACTURE OF THE SUPERIOR MAXILLA, AND ALSO OF THE INFERIOR MAXILLA.

By Norman W. Kingsley, M.D.S., D.D.S.

Michael Shyer—a carpenter fifty-two years of age, healthy and temperate, was assisting in the launching of a vessel on the 1st of March, 1873, when he was struck by a heavy bar across the left side of the face.

The blow produced a lacerated wound of the upper lip, an inch long, situated three-fourths of an inch above the right angle of the mouth; also a compound fracture of the superior maxilla, and a compound fracture of the inferior maxilla.

The fracture of the superior maxilla extended from behind the second bicuspid of the right side across the roof of the mouth, through the alveolar process on the left side, in the place where the first molar had been extracted; thence around in front, above the teeth, to the right side.

There was also a second fracture passing between the central and lateral incisors of the right side, running along the median line, and intersecting the one before described.

These two fragments, containing all the teeth anterior to the molars, were somewhat displaced, but there was little difficulty in restoring them, and none in retaining them in position. The lower jaw was broken in three places—one fracture occurring at the right of the symphysis; the second at the left of the symphysis; and the third at the neck of the condyle of the right side.

The displacement of the fragments was very marked—the anterior one, containing the two central incisors, was pulled down and backward, while the larger fragment of the right side, containing six teeth, was depressed at its anterior end, and much elevated posteriorly. The position of the fractures and the displacement is shown in Fig. 1.

Treatment.—The wound in the lip was closed with three silk ligatures, and a four-tailed bandage applied to the jaw; but a few days' trial proved its inefficiency, and impressions were taken preparatory to making an interdental splint.

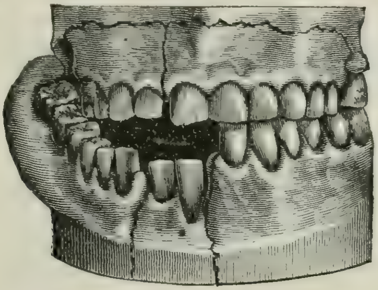


Fig. 1.

When the impression of the upper jaw was removed, it detached and displaced the loosened portions, but they were readily replaced, and required no support.

The splint was applied on the 9th of March. The patient experienced no pain or discomfort from wearing it, and ate the ordinary hospital food without difficulty. On the 20th of March he was discharged from the hospital, and on the 10th of April union was firm, and no deformity.

There are several things to be noticed in this case, of more than ordinary importance, as follows:

1st. Fractures of the superior maxilla require little or no help from ligatures, bandages or splints. A proper readjustment of the fragments is all that is necessary, unless the superincumbent integument is badly lacerated, and nature will take up and carry out the cure.

2d. Fractures of the ramus, or of the coronoid or condyloid process, can receive no benefit from an interdental, or any other splint, except incidentally.

3d. This case was most successfully treated, with a very simple appliance adapted to the anterior part of the jaw, and was an alteration of the Tongue-Holder or Duct Compressor in common use among dentists.

Fig. 2 shows the adaptation of this instrument as a dental splint: the chin-piece was padded with spongia-pilin. The internal portion was made of vulcanite, modeled to a reconstructed cast of the jaw, as de-

scribed in the last number of this journal. Fig. 3, taken from a photograph, shows the splint adjusted and in use.

The impressions, cast and adaptation of this instrument, were made by my assistants, Messrs. Gibson and W. H. Kingsley.

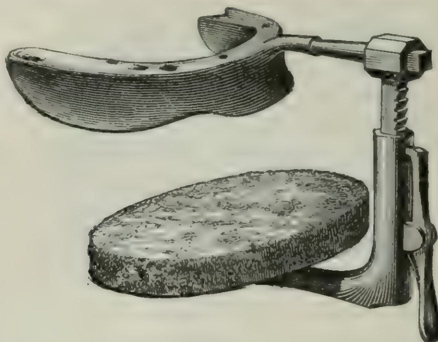


Fig. 2.

The appliance will recall to those who are familiar with such inventions, the splint of Lonsdale, but it possesses many advantages over

Fig. 3.

that instrument. It is less cumbrous, simpler in its construction, more readily applied, and more effective. The chin-piece can be re-

volved one quarter its circumference, and with proper padding will accommodate itself to any peculiarities.

For any fracture between the canine teeth it will probably prove as effective as any appliance that can be used. For any fracture of the body of the jaw back of the canine teeth it will not answer, because the internal splint and the mental compress must cover the posterior fragment and antagonize with each other. Recourse must then be had to a splint similar to the one figured in the last number of this journal.

The splint which, from all experience, seems to be the most desirable, is that one which shall immovably hold the fragments in their true position, and allow freedom of movement of jaw for speech, reception of food, and mastication.

Beyond all question, the interdental splint which can accomplish all this, in a case of compound fractured maxilla, without external attachments or bandages, and without entailing any injury upon the organs with which it comes in contact, is the best; but, unfortunately, the difficulty of retaining the fragments securely in such a splint is a very serious one. Gunning overcame this obstacle by drilling holes into sound molars and other teeth, and screwing the splint to the teeth. Certainly a most effectual, but an equally objectionable proceeding. Others have sought to avoid this difficulty by passing the screws through the splint, and between two firm contiguous teeth near the margin of the gum, which is certainly preferable to the former procedure. Others again have used wire or silken ligatures tied around the necks of various teeth, and either secured over the top of the splint, or around slots sawn into the edge and side of the splint.

In many cases it will be found impossible, by any ordinary means, to bring the fragments into their proper position in the splint, so as to secure them by either of the plans above set forth, and however desirable it may be to avoid external complication, they must be resorted to.

The interdental splint must then be supplemented by an external mental compress, so arranged and attached to the splint that the broken jaw shall be held, as it were, between the jaws of a vise, the tightening of which forces the fragments into the splint, and holds them securely.

This binding of the fragments between two parallel splints has been the evident aim of all such inventions, from the days of Pare to the present, and, as usual, the apparatuses have gone through all stages of complexity and clumsiness.

The idea, therefore, of a dental splint, is in no sense a modern one,

nor was the adoption of vulcanite for such a purpose other than the inevitable result of its acceptance for other interdental uses.

My own efforts have been directed mainly to making the most simple as well as the most effective appliance for the purpose which was possible, and avoiding, as far as possible, the objections to the inventions of my predecessors. Of the success of this effort, Professor Hamilton very kindly says, in his last work on the "Principles and Practice of Surgery," "The vulcanized rubber apparatus invented by Norman W. Kingsley, of this city, in point of simplicity and effectiveness, exceeds any which I have yet seen. This latter has been employed in a number of cases at Bellevue Hospital, and in no case has it failed to give entire satisfaction."

HALF A DENTIST.

The most sensitive need not hesitate to follow the remarks here made under this seemingly savage title.

It is because it is scarcely desirable that there should be permanently located in America the moiety whose written expression heads this article, that it may be well to call attention to a professional drift which bids fair to bring it about, and that speedily.

Dentistry is now a specialty as well recognized amongst civilized people as Surgery proper, and would claim as great respect if the selectiveness of a large number of its professors had not led to the neglect of a vital part of its practice.

It will be well at once to define the meaning of the term "Dentistry" as shown in the light of its past practice, and by the course of instruction considered necessary for its students by recognized educational bodies.

Dentistry, then, may be considered as the science which, taking as a basis the normal development of the teeth in man, and their healthy and complete condition, finds its sphere of usefulness in correcting their abnormal development, the treatment of their diseased conditions, and in the substitution of artful appliances to compensate for their partial or complete loss.

This is a sufficiently clear definition of "Dentistry," and its natural sequence, a "standard dentist," can be readilyd escribed. He would be one acquainted with the normal state of the teeth in man, able to correct abnormal development and treat diseased conditions, and last,

though by no means least, to furnish artful substitutes in cases where partial or entire loss of teeth had occurred.

This definition of "Dentistry" admitted, and the standard for the individual dentist allowed, can it be truly said that the average of dental practice to-day at all squares with its theory?

In the first place, it cannot be denied that the exigencies of professional life have led very many of the foremost men amongst us to limit practice, and, unfortunately for the reputation of Dentistry, this has been done by their ceasing to give attention to that part of it which is arbitrarily called "mechanical." This has led to the undue exaltation of a branch of practice which is not "mechanical," only in the sense of supplying no mechanism, the filling of teeth. This branch of Dentistry has, by the skill and assiduity of the eminent men who give it their attention, assumed a prominence rapidly becoming more and more unhealthy, because it is leading to the contemptuous neglect of a sister branch equally worthy of the regard of skillful and pains-taking men, and which must be of singular importance amongst a people who tend most towards that edentulous state which some savans say mankind will ultimately arrive at.

"Imitation is the sincerest form of flattery," and so a host of under-educated men are treating the American public to curtailed Dentistry, and would find their excuse in the fact that "Mechanical Dentistry" is practically ignored in good dental society. These men are difficult subjects to handle, being persistent and assertive, and as remarkable for the facile use of scientific terms in writing and debate as for the absence of scientific verities in their practice. You cannot pooh-pooh them, and no matter what abstruse subject the alumni discuss, they, like the poor, are ever with them.

Hence the fact, which it is impossible to shirk, that Dentistry is, as it were, torn in twain, and a fair half given over to the incompetent and the charlatan.

It is useless to say that "Mechanical Dentistry" receives due attention, that it is discussed by societies and forms part of the curriculum of educational bodies, whilst the land is flooded with work of which the last generation of dentists, could they see it, would be most heartily ashamed. It is talked about by societies, and forms part of the curriculum of educational bodies, and with these there can be no quarrel. Yet it is obvious that a college course of "Mechanical Dentistry" cannot be more than suggestive. The time taken up by it is too short, except to point out proper lines of practice, and, as far as possible, illus-

trate its teaching by examples. When it is considered that, now-a-days, in the majority of laboratories attached to dental offices, no provision is made for working anything but one or more of the cheap bases, one readily sees how it happens that the good practice inculcated by the colleges has made such a faint mark on the actual mechanical practice of to-day.

Many well intentioned and skillful men are ready here with another solution to account for this.

Their professional mythology leads them to believe in an evil spirit called "Rubber," to the malign influence of which they attribute the degradation of "Mechanical Dentistry." Yet rubber, in its purest form, is capable of better things than those who have only abused it know of; and when it is considered that Nemesis, in the shape of Josiah Bacon, dogs the heels of its unlicensed votaries, it is patent that a great clog has been placed upon its power for evil.

The fact is, that those who use rubber indiscriminately would use a more objectionable base as cheap and easily worked, to pander to popular demands for cheap work, and to enlarge their profits.

The indiscriminate use of rubber, and the use of most of the cheap and nasty bases for artificial teeth, so much in vogue, is consequent from, as well as causative of, the degradation of "Mechanical Dentistry."

The American public, naturally observing, and not unwisely apt to take men at less than their self-rated estimate, have seen how this branch of Dentistry has been ignored by competent men (who gave up its practice through want of time, perhaps,) and decried by their incompetent imitators who never knew what its practice was, but who make a show sufficiently fair to deceive an ever patient public. Hence comes the imperative demand for cheap work, and those who practice only in the great cities can hardly imagine how imperative this demand is in the provinces. A set of teeth is looked upon much as a pair of boots or a coat would be, only the teeth should cost less and last a great deal longer.

Ready to meet this demand are the omnipresent class whom it would be gross flattery to call dentists of any kind. They advertise largely and sententiously, and furnish teeth on sticking-plaster, pewter, or wretchedly-made rubber bases, and cheapness *ad nauseam* reigns supreme.

The people who, "physiologically speaking," as Wendell Holmes said, have no right to live at all, are here paralleled in the dental cosmogony, and if they could be kicked off the door-step of Dentistry, it would be well for her coming votaries and the public.

A low standard of work has thus been arrived at, and its effects are seen even in legitimate practice. Workmen who can work in anything but rubber or some of the cheap bases, are as scarce as four-leaved shamrocks, and we constantly see poor specimens of dental art hailing from the offices of good men.

How can this state of things be remedied? The reply is, by restoring "Mechanical Dentistry" to its true place in the profession. One would be led to imagine, from current writing, that "Oral Surgery" appertains only to that which is termed "Operative Dentistry." That it appertains equally to "Mechanical Dentistry," is so obvious that it would be almost a waste of time to discuss the point. Now, for the sake of argument, we will withdraw the annexe "Oral Surgery" from "Operative Dentistry," and what remains? As I have before said, a branch of Dentistry which is only not mechanical in the sense that it supplies no mechanism.

It is lawful for a dentist to become a specialist in Dentistry only after he has mastered the entire science, and when he has so mastered it there will be no fear of his despising any part of it. Not by division, but by union, can Dentistry be made more respectable, and only by this complete mastering of Dentistry as a whole by our future dentists can the proper standard of excellence be attained. *Festina lente* is a good motto for all who would really be artists, and those who are entering the profession may be sure that there is more to be learnt in Dentistry than a few months in a dental office and a scramble through a college course can teach them. This recognized and acted on, there is a certainty of the student becoming a complete, and not a "Half a Dentist only."

A. J. J.

ON PREMATURE LOSS OF THE TEETH.

A CLINICAL LECTURE DELIVERED AT THE DENTAL HOSPITAL.

By Charles S. Tomes, M.A.

The gradual loosening and ultimate loss of perfectly sound teeth is so general an occurrence in aged persons, that it has come to be regarded as one of the ordinary phenomena of senile change, although in an absolutely normal state no doubt the teeth ought to last as long as the rest of the organism. Amongst domesticated animals the loss of the teeth some time before the death of the animal is of common occurrence; but I do not know that it takes place among wild animals,

if we except the teeth of some of the seals, which are shed at a comparatively early period, and special teeth in some animals, such as certain of the bears and the kangaroos, which are shed while the rest of the teeth remain in full functional activity.

It is not, however, of this loss of the teeth at a time when the whole body is showing signs of diminished vigor, that I propose to speak today, but rather of those cases in which, in persons apparently in full bodily health and vigor, tooth after tooth becomes loose and falls out, or is extracted. Little is said about this malady in your text-books, for the reason that, though it is of the utmost importance to the sufferer, its pathology is very imperfectly understood, and its treatment regarded as hopeless, so that the patient is usually told that he must wait until the act of mastication comes to be imperfectly performed, and then fill up the gaps with artificial substitutes; and my intention is to lay before you, so far as I am able, the few reliable datas which we have, and the inferences to be drawn from them, as well as to introduce to your notice a plan of treatment, which, although I believe it to have been originally based on a wrong idea of the pathology of the disease, is nevertheless attended in practice with a fair amount of success.

In a typical case of the malady, the following are the usual symptoms: Some of the teeth, very generally at the back of the jaw, and often with exact symmetry on the two sides of the mouth, become slightly loose; the loosening rapidly increases, the gum separates from the necks of the teeth, and pus is, in small quantity, shed out around them. Then the teeth first affected either fall out, or become so troublesome that the patient desires to have them extracted, and this process spreads from tooth to tooth, generally attacking in regular succession those teeth which were next to the one first lost, till most or all of the teeth have been shed.

The age of the patient is seldom less than thirty-five, and I have, I think, more often observed it in males than in females; whether it be a matter of accident I know not, but certainly in the cases which have come under my own observation, the freedom of the teeth from caries has been noteworthy, and I recollect seeing this same remark made by some writer, whose name I do not now remember. When the progress of the disease is rapid there is very generally some little pain of a neuralgic character, rather than localized toothache, though when the teeth have become very loose their movement causes pain, and even may set up active inflammation in the soft parts around them.

The discharge which hangs about the necks of the teeth is exceedingly offensive, and has a peculiar characteristic odor, so that the nature of the case may usually be instantly recognized by the peculiar fœtor of the breath, even before any examination of the mouth has been made. The various stages may be studied in one and the same case, for it is rare for many teeth to be simultaneously attacked, and destruction of the sockets of all the teeth at the same time is a thing which never happens in the form of the disease occurring in persons of middle age.

The first indication of anything wrong is the thickening and rounding of the edge of the gum ; this should be, as you are aware, quite thin, almost sharp, closely applied to and embracing the necks of the teeth ; but it soon ceases to be so firmly applied, and between this thick rounded edge and the neck of the tooth, there is formed a groove, which speedily deepens, so that there comes to be a sort of pouch between the gum and the tooth, into which the end of a small instrument may be passed, and which is filled with shed-off epithelium, and a little pus ; at this time the free edge of the alveolus becomes bare and rough. The detachment of the tooth from the gum becomes deeper and wider, till the edge of the bony socket is reached ; this rapidly wastes, though not equally all round the tooth, so that it often happens that a piece of stiff twine will pass up on one side as far as half or two-thirds of the total depth of the socket, while on the other it will not enter at all.

If a steel instrument be used instead of the twine, a grittiness is felt, which, if the tooth be extracted, is found to be due partly to the roughness of the tooth fang, partly to that of the socket. On the tooth fang, this roughening is mainly due to irregular absorptions and redepositions of cementum, which often renders the apex of the fang quite sharp and rugged to the touch ; small incrustations of tartar are also found upon it. A thin ring of tartar also frequently embraces the neck of the tooth immediately below the edge of the gum, occupying that abnormal channel or groove which surrounds teeth when in this condition. At this period the gum around the affected teeth is spongy, of dusky-red color, and pressure upon it causes pus to exude around the necks of the teeth.

Now, the plan of treatment to which I alluded, which was introduced and warmly advocated by Dr. Riggs, of Hartford, Connecticut, is based upon the assumption, wrongly, as I think, that the deposition of tartar is the real cause of the disease, and as some of his ar-

guments are drawn from the treatment and its results, I will pass on to describe these before discussing the question of its true pathology.

His treatment consists in the absolute removal of the tartar, paying even more regard to that which is below the edge of the gum and within the socket, than to that which is visible. For this purpose he has devised a special set of instruments, by the use of a series of which, he affirms that every part of a tooth fang which has become detached from its investing tissue can be reached and scraped. Not only is the tooth scraped, *but the free edge of the alveoli*, which, as I have before noted, is felt to be rough and bare, is also scraped until the different sensations conveyed to the finger indicate that healthy bone has been reached. Necessarily the operation is a protracted and rather painful one, though, at all events, in the earlier stages of the malady it is not so painful as might have been anticipated; and, in order to do it efficiently, scalers more or less like Dr. Riggs' must be adopted, for the ordinary forms are perfectly useless for this purpose; and a considerable number of forms are essential, in order to thoroughly reach all the surfaces of bared tooth fang and alveolus.

This treatment, thoroughly carried out, does certainly bring about exceedingly good results. In cases so severe that the pillow was every night stained with the purulent and bloody discharge oozing from about the necks of the teeth, this discharge was entirely stopped, and the gum more closely embraced the necks of the teeth, which also became again firm, though, of course, not quite so firm as before. Several cases which had been operated upon at various times were shown to me whilst I was in the United States, and I had the opportunity of watching the progress of one myself; moreover, there is the concurrent testimony of many of the ablest dentists in the States, that not only is very great benefit at once obtained, but that after, at all events, two or three years, the malady has not returned.

Now, the unquestionable success of this treatment has been held to be strong, if not absolute confirmation of the idea that this loosening and loss of the teeth is due in the first instance to the deposition of tartar; but the facts admit of a perfectly different explanation, and do not, in my judgment, admit of explanation upon this hypothesis.

Of the occurrence of the tartar upon the neck of the teeth below the edge of the gum, and even down within the socket, where the tooth is detached from the soft tissues investing it, there is no question, for it is certainly there in many cases; the point is, is it *invariably* there, and is it the true cause of all the symptoms, or is it only an accident, so to

speak, and a consequence of the detachment rather than its cause. In the first place, is tartar invariably present? Since witnessing Dr. Riggs' treatment I have very carefully examined the necks and roots of teeth extracted when in this condition, and although its presence is the general rule, yet in one or two of the best marked examples of the disease, none has been perceptible with a hand magnifier. Moreover, in one of the cases I carefully felt around the necks of several teeth which presented the earliest indication of mischief—namely, a thick rounded edge to the gum—and was unable to detect any tartar, even at a time when the thin edge of the alveolus was bared, and readily touched by the instrument.

But quite apart from the presence of tartar not being demonstrable in all cases, there are many other reasons which clearly point to some more general cause being at work; amongst others I may enumerate—

(1) That it seldom or almost never attacks persons under thirty-five or forty.

(2) That it is often distinctly hereditary.

(3) That, although it ultimately involves many teeth, it does not attack them simultaneously, but usually seems to spread from tooth to tooth.

(4) That, *cœteris paribus*, it especially affects dead teeth.

(5) That, whereas the deposition of a line of tartar around the neck of a tooth is exceedingly common, this rapid destruction of the alveoli is not very common. Abandoning, then, the theory that tartar is the primary cause, we must fall back upon the symptoms to afford some explanation of its real nature. The first thing noticeable is a thickening and rounding of the free edge of the gum; now, this is continuous with the alveolar periosteum, and the intimacy of their connection is well exemplified by that thin bright red line on the gum around a tooth, with which you are so familiar as a trustworthy indication of inflammation of the alveolar periosteum. Moreover, at an early period the edge of the alveolus can be felt bare and rough around the neck of the tooth, so that the first point at which we are able to point to an abnormal condition, is the place of fusion between the gum and alveolar periosteum, *i. e.*, the edge of the alveolus. Ultimately, the whole lining of the socket participates, but it does not do so at the outset, else the teeth would probably be raised in the sockets, and tender, which they are not, until an advanced stage.

And, indeed, the success of Dr. Riggs' treatment is just as easily explained, and, in fact, more so, on the hypothesis that the primary seat

of the disease is the edge of the alveolus. The surgeon, when he gouges and scrapes a carious bone, usually effects a temporary cure, and in very many cases the disease does not recur; again, the dentist who removes a tooth scrapes from it the diseased periosteum, and replaces it, also may succeed in remedying, temporarily, at all events, the morbid and painful condition. Now, the essential feature of Dr. Riggs' operation lies in the scraping of the alveolar edge; it is in this that it differs from ordinary scaling, and it is to this, most probably, that his success is due: he removes the diseased portion, gives the part a fresh start, so to speak, and often effects a cure.

For a few years past I have been in the habit of treating these cases by placing small fragments of fused chloride of zinc in the pouch between the gums and the teeth, and this treatment has been followed by marked improvement, which is intelligible enough if the edge of the alveolus be the site of the disease, but perfectly inexplicable if the presence of tartar was the real source of trouble.

On the whole, then, the conclusion most in accordance with the facts is that the disease is one affecting the alveolar periosteum at the margin of the alveolus, and progessing thence downwards into the socket, until ultimately the whole bony alveolus is removed. If it is taken at an early stage, both reason and some experience point to its being possible to arrest it by a removal of the part affected. At all events, Dr. Riggs' operation deserves a thorough and wide trial, and I would counsel you to practice it upon any suitable case, remembering, however, that its efficacy depends upon its being thoroughly carried out, and that this is only possible with the exercise of some endurance on the part of the patient, and a great deal of patience on the part of the operator.—*Monthly Review of Dental Surgery.*

WOMEN DENTISTS IN EGYPT.

Dr. Edward Warren writes from Cairo, Egypt, to a friend in Baltimore, that there is "a good opportunity for women dentists in Egypt, as the women are forbidden to consult with men." There are three or four English women practicing dentistry in Cairo already, according to Dr. Warren's letter. In all these eastern countries there seems to be a wide field of usefulness and profit for women doctors and dentists.

[*Scientific American.*

CLEFT PALATE THE EFFECT OF INSUFFICIENT NUTRITION BEFORE BIRTH.

It is said that "ninety-nine per cent. of the *lion cubs* born in the Garden of the Zoological Society, Regent's Park, London, have cleft palates ; so that they are unable to take nourishment, and consequently soon die.

"At the Dublin Zoological Gardens, however, there are very few such cases ; nine-tenths of such cubs have been successfully reared. This difference has been attributed to the difference in the food of the parent lions—those in London being fed only on the meat of large animals, so that they are unable to eat any of the bones ; whereas, at Dublin, a goat, twice a week, is given them, which they eat, bones and all. This provides the bone phosphates needed for the organization of the young animals. Prior to the adoption of this method of feeding at Dublin, malformation of the palate was as common among the cubs there as it now is at London."

This is a fruitful field for thought, and exceedingly suggestive on the subjects in hand. The osseous texture of the lion is greater than that of any other animal, and being purely carnivorous, it shows a larger percentage of the phosphates in the flesh of animals than is usually admitted. In this deduction we find that well-organized cubs are produced from the nourishment obtained from the flesh of animals alone, with the single exception of the cleft palate, and that, too, in the powerful species above referred to.

Now take the human subject, which is both carnivorous and granivorous. The flesh of animals is almost universally used as food, which alone, according to the above experiment, would furnish almost enough of bone material to complete the organization, to say nothing of the abundance of vegetable food everywhere in use. Our deduction, therefore, is, that with a free use of vegetable diet and animal food, we at all times obtain sufficient nourishment for the dental organs, as well as the whole bony structure of the system, though we use white bread, and entirely discard the Graham bread and Graham mush, of which there is so much account made by a certain class of modern physiologists. The amazing amount of physical distress and dental disintegration which is met on every hand, does not occur so much from an insufficiency of bone element in our food, as the inability of our physical powers to make use of what we get, through careless habits, riotous living, and that inordinate tendency to dissipation which characterizes the whole race of mankind.—*Pennsylvania Journal of Dental Science.*

OXYGEN GAS AS A REMEDY IN DISEASE.

From New York Medical Journal.

By Andrew H. Smith, M.D.,

Member of the Academy of Natural Sciences, Philadelphia ; Corresponding Member of the Gesellschaft fur Heilkunde, Berlin ; late Assistant Surgeon and Brevet Major U. S. Army, etc.

CHAPTER II.

MODES OF PREPARATION AND ADMINISTRATION.

In the preparation of oxygen for medical use, *purity* is, of course, of the very first importance. Undoubtedly many of the effects formerly attributed to oxygen, such as the production of bronchial irritation or inflammation, and even of pneumonitis, were owing to impurities in the gas employed.

The first substance from which oxygen was isolated was the peroxide of mercury, and in all the earlier experiments the gas employed was obtained from this source. It was not long, however, before cases of ptyalism occurring, warned experimenters of the danger of using the oxides of mercury for this purpose.

Chaptal showed, by carefully-conducted experiments, that oxygen so prepared contained an appreciable quantity of the metal. The peroxide of manganese was then substituted, and finally chlorate of potash.

Recently quite a number of processes have been added to the list, so that it now embraces a large range of procedures by which oxygen may be obtained with more or less facility. I will touch briefly upon the more prominent of these, only one having been found by experience to be really adapted to the use of the physician :

1. Decomposition of binoxide of manganese. This is accomplished by heating the oxide to a red heat in an iron retort, or by treating it with sulphuric acid. In the first case a high heat is required, and in the second the acid is disagreeable, and dangerous in general practice. Moreover, the gas contains four or five per cent. of nitrogen from the impurities usually contained in the manganese. If commercial acid is used, it also imparts its impurities to the gas, and among them usually a certain proportion of arsenic. These considerations have led to the complete abandonment of this method in practice.

2. The decomposition of sulphuric acid, or sulphate of zinc. This process depends upon the decomposition of sulphuric acid by heat into oxygen and sulphurous acid, or that of sulphate of zinc into oxygen, sulphurous acid, and oxide of zinc. It is probable that oxygen could be produced in large quantities in this manner at a very small

cost, so that it would be available for industrial purposes; but, for the use of the physician, the complexity and cost of the apparatus required render it an undesirable method.

3. Process of Boussingault. This consists in procuring oxygen from baryta, in utilizing the property which the latter possesses of fixing the oxygen of the air at an elevated temperature, and giving it off again when the temperature is raised still higher. It is difficult to manage, however, and the results are not satisfactory. The apparatus, also, is bulky and expensive.

4. Reaction of sulphuric acid upon bichromate of potash. This reaction results in the production of oxygen and chrome alum. About sixteen per cent. of oxygen is yielded by the bichromate. This yield is too small to render the method desirable, aside from the objections belonging to every process which requires a powerful acid to be placed in unskilled hands.

5. Decomposition of chloride of lime by cobalt. The oxide or any of the salts of cobalt have the property of inducing a species of catalytic action between chlorine and lime, from which free oxygen and chloride of calcium result. An extremely minute quantity of cobalt only is required. If a stream of chlorine gas is passed into warm milk of lime, containing a little of a salt of cobalt in solution, the chlorine is absorbed, and oxygen is given off, and at the close of the process chloride of calcium will have taken the place of the lime. This method of procuring oxygen is known as Fleitmann's process. Now, by using chloride of lime, we have the chlorine and the lime united in one substance, and, by merely adding the cobalt, and pouring on a little hot water, the process is greatly simplified. The gas, however, contains considerable chlorine, and the yield is small in proportion to the quantity of material employed. This process is the one recommended by Dr. Beigel for preparing oxygen for medical use, and his recommendation is sustained by Birch, who, however, prefers compressed oxygen when it can be obtained. I have given the method a trial, but, in my hands, the quantity of gas was so small, and the quality so inferior, that I abandoned its use. However, as the cost is very slight, it might be used with advantage in office practice, where a large stationary apparatus could be employed, and where arrangements could be made for washing the gas through an alkaline solution to remove the chlorine. But, for use at the bedside, an apparatus, small enough to be portable, would not yield the gas in sufficient quantities.

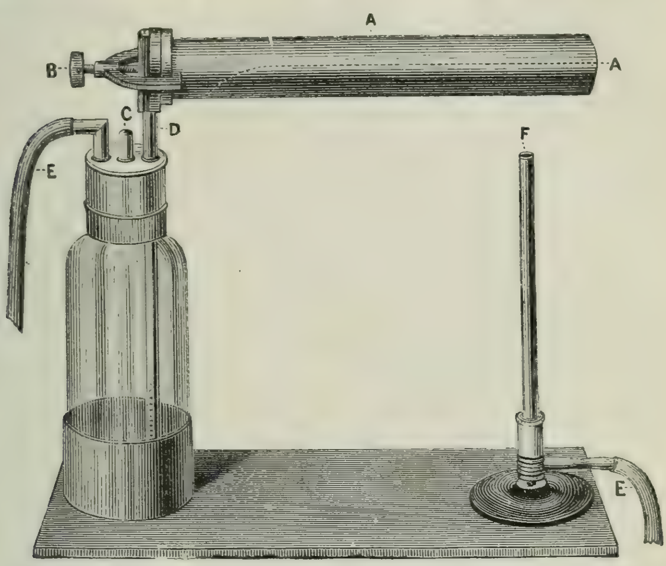
It remains to consider the method of obtaining oxygen by the de-

composition of chlorate of potash. This substance, having the formula $KO, ClO^5 = KCl + O^6$, is broken up by heat into oxygen and chloride of potassium.

By mixing with the chlorate a little peroxide of manganese, the disengagement of the oxygen proceeds with greater rapidity and requires much less heat. It is usual to invoke the action of catalysis to explain this, but it seems to me to be owing simply to the facility with which the manganese conducts the heat and diffuses it through the whole mass. Chlorate of potash alone is an exceedingly bad conductor of heat, as is also chloride of potassium. Hence the action of slight degrees of heat is confined to that part only of the mass exposed which is in contact with the retort. But the manganese, being a heavy metallic substance, transmits the heat readily from particle to particle of the salt. Any other substance having an equal conducting power will do as well, provided it will not combine with oxygen. I have succeeded admirably with black oxide of copper. Sand may be used, but with less advantage, as it is comparatively a poor conductor. It is generally stated that this process yields perfectly pure oxygen gas. This, however, is not the case if the evolution is at all rapid, as the gas will then be slightly contaminated with chlorine. There is also another impurity, not noticed in any work on chemistry which I have seen. Pure oxygen, as is well known, is invisible, yet the product from chlorate of potash has usually more or less of a smoky appearance when first evolved. If the gas be allowed to stand for half an hour or an hour, it will lose this appearance, while the glass vessel in which it is contained will be seen to have a deposit on its inner surface. Under the microscope this deposit is found to consist of minute crystalline particles. If enough of these be collected to respond to chemical tests, they will be found to be chlorate of potash. It would seem, then, that a small portion of the chlorate, instead of being decomposed by the heat, is sublimed unchanged, and such is its insolubility that it is not separated from the gas except by repeated washings. Not the least harm results, however, from inhaling it, as I have demonstrated repeatedly in my own person.

The quantity of gas procured by this process is very great, amounting in round numbers to five hundred cubic inches for each ounce of the chlorate of potash, or thirty-nine per cent. by weight. The quantity yielded renders this method peculiarly adapted for use in the sick-room, where portability of apparatus and material is much to be desired. Until recently I have employed a copper flask in which to heat

the materials. But I found inconvenience to result from this form of container, inasmuch as the entire quantity of the chlorate was heated at once, resulting in a tumultuous and often unmanageable evolution of the gas. To obviate this difficulty, I have had constructed the apparatus figured in the annexed cut. It consists essentially of a brass



A, retort. The dotted line indicates the manner in which the chlorate of potash is to be disposed. B, clamp, holding the retort in position. C, safety-valve. D, tube leading into the wash-bottle. E, delivery-tube. F, Bunsen burner.

retort in the form of a cylinder, nine inches long and one and a quarter inches in diameter, resembling in shape a very large test-tube. To the open extremity of this retort is fitted a cover of cast iron, held in place by a clamp which catches upon a projecting flange surrounding the mouth of the retort. This clamp is tightened by means of a screw. Passing through the cover is the tube carrying the gas into the wash-bottle, and which is arranged at a right angle to the retort. The latter is therefore in a horizontal position, and is supported by its connections with the wash-bottle, which in its turn is firmly fastened to a board forming the base of the whole apparatus. The tube before referred to passes to the bottom of the wash-bottle, and has near its lower extremity a great number of very small holes through which the gas escapes in fine bubbles. This is important, as it insures a much more perfect washing of the gas. Another tube, merely passing through the cap of

the wash-bottle, provides for the passage of the gas into the bag from which it is inhaled.

The retort is but half filled with the mixture of chlorate of potash and peroxide of manganese, and this quantity is distributed along its whole length to within an inch of the cover, thus leaving nearly one-half of the diameter of the retort free for the passage of the gas. The heat of a Bunsen burner or of a powerful spirit-lamp is employed, beginning first at the closed extremity of the retort and moving it along as the material becomes exhausted. The wash-bottle is half filled with a solution of caustic potash.

The advantage of this apparatus is, that only a small portion of the material is heated at a time, and the rapidity of evolution is under perfect control. By having two retorts, and using them alternately, a continuous supply may be kept up, sufficient for any emergency. The whole apparatus, including the bag, may be easily packed in a box ten inches square and five inches deep, and a supply of gas may be generated in fifteen minutes, at the house of the patient.

In using black oxide of manganese in connection with chlorate of potash, it is important that it should be free from protoxide, and from any combustible substance. Neglect of this caution may lead to an explosion.

The process of Téssie du Môtay is as follows : Manganate of soda is exposed to a very high heat in iron retorts, and while in that heat a current of atmospheric air is passed over it. This results in the absorption by the salt of a large portion of the oxygen which the air contains. The current of air is then shut off, and a current of superheated steam substituted. The steam withdraws from the manganate of soda the added quantity of oxygen, and carries it with it to a condenser from which the oxygen passes in a pure state into the gasometer. The salt is then subjected to the action of a second portion of air, followed again by a current of steam, and thus the process goes on indefinitely. The manganate of soda retains its activity, and loses nothing in weight, so that the only consumption is that of fuel.

For use in the sick-room, the gas may be compressed into cylinders of copper or iron, and thus rendered conveniently portable.

In localities sufficiently near to a factory, this is destined to supersede all other methods of supplying oxygen for medical purposes.

The gas is perfectly pure, and the quantity which can be compressed into even a small cylinder is sufficient to meet the immediate requirements of any case likely to occur.

The method of administration of oxygen is very simple. The gas, being in a bag or in a gasometer, is conveyed to the mouth or nostrils of the patient by means of a flexible tube, terminating in a mouth-piece of glass, hard rubber, or ivory. This being taken into the mouth, or held to one nostril, the patient breathes the oxygen mingled with a greater or less proportion of common air, one or both nostrils being free for the admission of the latter. The proportion of gas is regulated by the size of the orifice through which it escapes. During *expiration* the rubber tube is compressed between the thumb and index-finger. When the patient is not able to do this for himself, it may be done by an attendant, who, by watching the movements of the chest, soon catches their rhythm. I prefer this plan to the use of an inhaler with a complicated system of valves, which always offers an impediment to respiration.*

The quantity given will vary from one or two gallons daily, which is sufficient in some chronic cases, to eighty or one hundred gallons or more, which may be required in urgent dyspnœa. In chronic cases it should be given from a very small orifice, so that the inhalation of four or five gallons will occupy fifteen to thirty minutes. Feeble patients should take it in the recumbent position.

The inhalations may be repeated morning and evening, or less frequently, as the case may demand. Some very striking results have followed when the interval was as great as three days. On the other hand, when respiration is very much obstructed, it may be necessary to give the gas almost constantly, and but little diluted.

Knowing the capacity of the bag employed, and bearing in mind that an adult usually respires from eight to ten pints of air per minute, it is easy to judge approximately of the quantity of oxygen which is being inhaled.

The plan of surcharging the atmosphere of a room with oxygen, and allowing the patient to remain in it for a certain period, has this disadvantage, that, to retain the oxygen, ventilation must be sacrificed. If the room be so large as to do away with this objection, the quantity of oxygen required will be greater than can generally be supplied. These considerations have led to the abandonment of this mode of administration.

Dr. Birch lays great stress upon the gas being given in what he calls

* Messrs. Geo. Barth & Co., of London, have patented a very neat gasometer for inhaling the gas when liberated from pressure in the iron bottles in which they supply it. The deodorized rubber bag will, however, be generally preferred on account of its portability and cheapness.

a "*quasi-nascent*" condition; that is, he thinks it should be inhaled at once as rapidly as it is generated; or, if not, that it should be kept under pressure until wanted for use. It is enough to say that he brings forward no facts to sustain the alleged advantage of this plan, and that, moreover, others who have not followed it have obtained equally good results. (*Continued in No. 3.*)

DEATH FROM THE USE OF SULPHURIC ETHER.

The inquest at Lynn, in the case of Mrs. Homan, is at last over, and the jury has rendered the following verdict:

"That the said Elizabeth M. Homan came to her death at her residence, 7 Pleasant Street, Lynn, on the fourth day of December, 1873, between the hours of four and five o'clock, P. M., from the combined effect of sulphuric ether and nervous exhaustion, while undergoing a trifling surgical operation; and the jury further find that the etherization and operation were properly done, and that prompt, energetic and all necessary measures were employed to resuscitate the patient."

Instead of following the long and tedious account of the case, as elicited by the evidence, we will endeavor to state it briefly.

In the course of November, Dr. Bixby, of Boston, was called in consultation by Dr. Graves, of Lynn, to see the deceased, who was suffering from some obscure pelvic trouble. On November 25th, Dr. Bixby, by means of the aspirator, detected and emptied a pelvic abscess. It filled up again rapidly, and, on December 4th, Dr. Bixby considered another operation essential to the safety of the patient, who was apparently in a very poor condition. Mrs. Homan was very unwilling to take ether, but tacitly consented to the persuasions of the physicians. Dr. Graves gave the ether, and Dr. Bixby attended solely to the operation. He punctured the abscess with a trocar through the vagina. Over a pint of pus had escaped, and more was flowing, when the patient was found to be dead. Here the evidence was somewhat conflicting: Dr. Bixby thinks he was the first to perceive that the patient was perfectly motionless, while Dr. Graves states that some five minutes after the discontinuance of the ether he noticed that the patient gasped, upon which he pulled the tongue forward, that she then gasped once or twice more, and expired; that he then notified Dr. Bixby. Every effort at resuscitation was made, and apparently well

made, but artificial respiration and the battery were alike useless. After rather more than half an hour, they left the house and went for the coroner. An irregular practitioner was then called in, who testified, as did also some of the naturally excited relations, that the pulse was still beating. We pass over this evidence without comment. Dr. Pinkham, the coroner, who was the next to arrive, thought that life was extinct. The ether was examined by Dr. Wood, and found pure. The autopsy showed dermoid cysts in each ovary, chronic inflammation of the bladder, and enlargement of the uterus; between these two organs was the cavity of the abscess. The heart was weak, but not diseased.

We shall not discuss the coroner's verdict, for which the medical community can hardly be considered responsible; although we might, perhaps, ask whether, in a case of extreme nervous exhaustion, with cystitis, the evacuation of more than a pint of pus from an inflamed abscess near the fundus of the uterus, can be considered "a trivial surgical operation." We pass directly to the main question at issue.

This case suggests two questions: 1st. Did anæsthesia contribute to death? 2d. Was the anæsthetic employed better or worse than any other? To the first question we reply that anæsthesia undoubtedly contributed to death—it often does. It is a depressing influence of great power, and in an operation of this kind a full dose is requisite to relax the muscles of the pelvis and thighs. Such a dose, in the case of a feeble patient, often demands great vigilance. Without intending any objectionable criticism, we think it fair to say that were the operation to do over again, the result might be more favorable. How often do we see weak patients barely carried through operations under anæsthesia, by the combined skill of many experienced assistants? We here leave this part of the subject, distinctly recognizing that anæsthesia was, in this case, one of the causes of death; an occurrence familiar to all.

To the second question we reply as distinctly that in our belief ether was the best anæsthetic that could have been used. Had chloroform been employed, the patient would have had, not only the same chance of dying from the depressing influence of anæsthesia, but, also, the additional chance of sudden death from that peculiar and toxic property of chloroform by which it is possible for twenty drops, even when skillfully administered, to suddenly kill a strong and healthy man. This danger was avoided by the use of ether, which owes to the absence of this property its superiority to chloroform.

[*From Boston Med. and Sur. Journal.*

THE THEORY OF MOLECULES.

A LECTURE DELIVERED BEFORE THE BRITISH ASSOCIATION AT BRADFORD,
BY PROFESSOR CLERK MAXWELL, F. R. S.

From the Popular Science Monthly.

An atom is a body which cannot be cut in two. A molecule is the smallest possible portion of a particular substance. No one has ever seen or handled a single molecule. Molecular science, therefore, is one of those branches of study which deal with things invisible and imperceptible by our senses, and which cannot be subjected to direct experiment.

The mind of man has perplexed itself with many hard questions. Is space infinite, and if so in what sense? Is the material world infinite in extent, and are all places within that extent equally full of matter? Do atoms exist, or is matter infinitely divisible?

The discussion of questions of this kind has been going on ever since men began to reason, and to each of us, as soon as we obtain the use of our faculties, the same old questions arise as fresh as ever. They form as essential a part of the science of the nineteenth century of our era, as of that of the fifth century before it.

We do not know much about the science organization of Thrace twenty-two centuries ago, or of the machinery then employed for diffusing an interest in physical research. There were men, however, in those days, who devoted their lives to the pursuit of knowledge with an ardor worthy of the most distinguished members of the British Association; and the lectures in which Democritus explained the atomic theory to his fellow-citizens of Abdera realized, not in golden opinions only, but in golden talents, a sum hardly equaled even in America.

To another very eminent philosopher, Anaxagoras, best known to the world as the teacher of Socrates, we are indebted for the most important service to the atomic theory, which, after its statement by Democritus, remained to be done. Anaxagoras, in fact, stated a theory which so exactly contradicts the atomic theory of Democritus that the truth or falsehood of the one theory implies the falsehood or truth of the other. The question of the existence or non-existence of atoms cannot be presented to us this evening with greater clearness than in the alternative theories of these two philosophers.

Take any portion of matter, say a drop of water, and observe its properties. Like every other portion of matter we have ever seen, it is divis-

ible. Divide it in two, each portion appears to retain all the properties of the original drop, and among others that of being divisible. The parts are similar to the whole in every respect except in absolute size.

Now go on repeating the process of division till the separate portions of water are so small that we can no longer perceive or handle them. Still we have no doubt that the subdivision might be carried further, if our senses were more acute and our instruments more delicate. Thus far all are agreed, but now the question arises, Can this subdivision be repeated forever?

According to Democritus and the atomic school, we must answer in the negative. After a certain number of subdivisions, the drop would be divided into a number of parts, each of which is incapable of further subdivision. We should thus, in imagination, arrive at the atom, which, as its name literally signifies, cannot be cut in two. This is the atomic doctrine of Democritus, Epicurus, and Lucretius, and, I may add, of your lecturer.

According to Anaxagoras, on the other hand, the parts into which the drop is divided are in all respects similar to the whole drop, the mere size of a body counting for nothing as regards the nature of its substance. Hence if the whole drop is divisible, so are its parts, down to the minutest subdivisions, and that without end.

The essence of the doctrine of Anaxagoras is, that the parts of a body are in all respects similar to the whole. It was therefore called the doctrine of Homoiomereia. Anaxagaros did not of course assert this of the parts of organized bodies such as men and animals, but he maintained that those inorganic substances which appear to us homogeneous are really so, and that the universal experience of mankind testifies that every material body, without exception, is divisible.

The doctrine of atoms and that of homogeneity are thus in direct contradiction.

But we must now go on to molecules. Molecule is a modern word. It does not occur in Johnson's "Dictionary." The ideas it embodies are those belonging to modern chemistry.

A drop of water, to return to our former example, may be divided into a certain number, and no more, of portions similar to each other. Each of these the modern chemist calls a molecule of water. But it is by no means an atom, for it contains two different substances, oxygen and hydrogen, and by a certain process the molecule may be actually divided into two parts, one consisting of oxygen and the other of hydrogen. According to the received doctrine, in each molecule of water

there are two molecules of hydrogen and one of oxygen. Whether these are or are not ultimate atoms I shall not attempt to decide.

We now see what a molecule is, as distinguished from an atom.

A molecule of a substance is a small body, such that if, on the one hand, a number of similar molecules were assembled together, they would form a mass of that substance, while, on the other hand, if any portion of this molecule were removed, it would no longer be able, along with an assemblage of other molecules similarly treated, to make up a mass of the original substance.

Every substance, simple or compound, has its own molecule. If this molecule be divided, its parts are molecules of a different substance or substances from that of which the whole is a molecule. An atom, if there is such a thing, must be a molecule of an elementary substance. Since, therefore, every molecule is not an atom, but every atom is a molecule, I shall use the word molecule as the more general term.

I have no intention of taking up your time by expounding the doctrines of modern chemistry with respect to the molecules of different substances. It is not the special, but the universal interest of molecular science, which encourages me to address you. It is not because we happen to be chemists or physicists or specialists of any kind that we are attracted toward this centre of all material existence, but because we all belong to a race endowed with faculties which urge us on to search deep and ever deeper into the nature of things.

We find that now, as in the days of the earliest physical speculations, all physical researches appear to converge toward the same point, and every inquirer, as he looks forward into the dim region toward which the path of discovery is leading him, sees, each according to his sight, the vision of the same quest.

One may see the atom as a material point, invested and surrounded by potential forces. Another sees no garment of force, but only the bare and utter hardness of mere impenetrability.

But though many a speculator, as he has seen the vision recede before him into the innermost sanctuary of the inconceivably little, has had to confess that the quest was not for him, and though philosophers in every age have been exhorting each other to direct their minds to some more useful and attainable aim, each generation, from the earliest dawn of science to the present time, has contributed a due proportion of its ablest intellects to the quest of the ultimate atom.

Our business this evening is to describe some researches in molecular

science, and in particular to place before you any definite information which has been obtained respecting the molecules themselves. The old atomic theory, as described by Lucretius and revived in modern times, asserts that the molecules of all bodies are in motion, even when the body itself appears to be at rest. These motions of molecules are, in the case of solid bodies, confined within so narrow a range that even with our best microscopes we cannot detect that they alter their places at all. In liquids and gases, however, the molecules are not confined within any definite limits, but work their way through the whole mass, even when that mass is not disturbed by any visible motion.

This process of diffusion, as it is called, which goes on in gases and liquids, and even in some solids, can be subjected to experiment, and forms one of the most convincing proofs of the motion of molecules.

Now, the recent progress of molecular science began with the study of the mechanical effect of the impact of these moving molecules when they strike against any solid body. Of course these flying molecules must beat against whatever is placed among them, and the constant succession of these strokes is, according to our theory, the sole cause of what is called the pressure of air and other gases.

This appears to have been first suspected by Daniel Bernoulli, but he had not the means which we now have of verifying the theory. The same theory was afterward brought forward independently by Lesage, of Geneva, who, however, devoted most of his labor to the explanation of gravitation by the impact of atoms. Then Herapath, in his "Mathematical Physics," published in 1847, made a much more extensive application of the theory to gases; and Dr. Joule, whose absence from our meeting we must all regret, calculated the actual velocity of the molecules of hydrogen.

The further development of the theory is generally supposed to have been begun with a paper by Krönig, which does not, however, so far as I can see, contain any improvement on what had gone before. It seems, however, to have drawn the attention of Professor Clausius to the subject, and to him we owe a very large part of what has been since accomplished.

We all know that air or any other gas placed in a vessel presses against the sides of the vessel, and against the surface of any body placed within it. On the kinetic theory this pressure is entirely due to the molecules striking against these surfaces, and thereby communicating to them a series of impulses which follow each other in such rapid succession that they produce an effect which cannot be distinguished from that of a continuous pressure.

If the velocity of the molecules is given, and the number varied, thence since each molecule, on an average, strikes the side of the vessel the same number of times, and with an impulse of the same magnitude, each will contribute an equal share to the whole pressure. The pressure in a vessel of given size is therefore proportional to the number of molecules in it, that is, to the quantity of gas in it.

This is the complete dynamical explanation of the fact discovered by Robert Boyle, that the pressure of air is proportional to its density. It shows also that, of different portions of gas forced into a vessel, each produces its own part of the pressure independently of the rest, and this whether these portions be of the same gas or not.

Let us next suppose that the velocity of the molecules is increased. Each molecule will now strike the sides of the vessel a greater number of times in a second, but besides this, the impulse of each blow will be increased in the same proportion, so that the part of the pressure due to each molecule will vary as the *square* of the velocity. Now, the increase of the square of velocity corresponds, in our theory, to a rise of temperature, and in this way we can explain the effect of warming the gas, and also the law discovered by Charles, that the proportional expansion of all gases between given temperatures is the same.

The dynamical theory also tells us what will happen if molecules of different masses are allowed to knock about together. The greater masses will go slower than the smaller ones, so that, on an average, every molecule, great or small, will have the same energy of motion.

The proof of this dynamical theorem, in which I claim the priority, has recently been greatly developed and improved by Dr. Ludwig Boltzmann. The most important consequence which flows from it is, that a cubic centimetre of every gas at standard temperature and pressure contains the same number of molecules. This is the dynamical explanation of Gay-Lussac's law of the equivalent volumes of gases. But we must now descend to particulars, and calculate the actual velocity of a molecule of hydrogen.

A cubic centimetre of hydrogen, at the temperature of melting ice and at a pressure of one atmosphere, weighs 0.00008954 gramme. We have to find at what rate this small mass must move (whether altogether or in separate molecules makes no difference) so as to produce the observed pressure on the sides of the cubic centimetre. This is the calculation which was first made by Dr. Joule, and the result is 1,859 metres per second. This is what we are accustomed to call a great velocity. It is greater than any velocity obtained in artillery practice.

The velocity of other gases is less, as you will see by the table, but in all cases it is very great as compared with that of bullets.

We have now to conceive the molecules of the air in this hall flying about in all directions, at a rate of about seventeen miles a minute.

If all these molecules were flying in the same direction, they would constitute a wind blowing at the rate of seventeen miles a minute, and the only wind which approaches this velocity is that which proceeds from the mouth of a cannon. How, then, are you and I able to stand here? Only because the molecules happen to be flying in different directions, so that those which strike against our backs enable us to support the storm which is beating against our faces. Indeed, if this molecular bombardment were to cease, even for an instant, our veins would swell, our breath would leave us, and we should, literally, expire. But it is not only against us or against the walls of the room that the molecules are striking. Consider the immense number of them, and the fact that they are flying in every possible direction, and you will see that they cannot avoid striking each other. Every time that two molecules come into collision, the paths of both are changed, and they go off in new directions. Thus each molecule is continually getting its course altered, so that, in spite of its great velocity, it may be a long time before it reaches any great distance from the point at which it set out.

I have here a bottle containing ammonia. Ammonia is a gas which you can recognize by its smell. Its molecules have a velocity of six hundred metres per second, so that, if their course had not been interrupted by striking against the molecules of air in the hall, every one in the most distant gallery would have smelt ammonia before I was able to pronounce the name of the gas. But, instead of this, each molecule of ammonia is so jostled about by the molecules of air, that it is sometimes going one way and sometimes another. It is like a hare which is always doubling, and, though it goes a great pace, it makes very little progress. Nevertheless, the smell of ammonia is now beginning to be perceptible at some distance from the bottle. The gas does diffuse itself through the air, though the process is a slow one, and, if we could close up every opening of this hall so as to make it air-tight, and leave everything to itself for some weeks, the ammonia would become uniformly mixed through every part of the air in the hall.

This property of gases, that they diffuse through each other, was first remarked by Priestley. Dalton showed that it takes place quite independently of any chemical action between the inter-diffusing gases.

Graham, whose researches were especially directed toward those phenomena which seem to throw light on molecular motions, made a careful study of diffusion, and obtained the first results from which the rate of diffusion can be calculated.

Still more recently, the rates of diffusion of gases into each other have been measured with great precision by Prof. Loschmidt, of Vienna.

He placed the two gases in two similar vertical tubes, the lighter gas being placed above the heavier, so as to avoid the formation of currents. He then opened a sliding-valve, so as to make the two tubes into one, and, after leaving the gases to themselves for an hour or so, he shut the valve, and determined how much of each gas had diffused into the other.

As most gases are invisible, I shall exhibit gaseous diffusion to you by means of two gases, ammonia and hydrochloric acid, which, when they meet, form a solid product. The ammonia, being the lighter gas, is placed above the hydrochloric acid, with a stratum of air between, but you will soon see that the gases can diffuse through this stratum of air, and produce a cloud of white smoke when they meet. During the whole of this process, no currents or any other visible motion can be detected. Every part of the vessel appears as calm as a jar of undisturbed air.

But, according to our theory, the same kind of motion is going on in calm air as in the inter-diffusing gases, the only difference being that we can trace the molecules from one place to another more easily when they are of a different nature from those through which they are diffusing.

If we wish to form a mental representation of what is going on among the molecules in calm air, we cannot do better than observe a swarm of bees, when every individual bee is flying furiously, first in one direction, and then in another, while the swarm, as a whole, either remains at rest, or sails slowly through the air.

In certain seasons, swarms of bees are apt to fly off to a great distance, and the owners, in order to identify their property when they find them on other people's ground, sometimes throw handfuls of flour at the swarm. Now, let us suppose that the flour thrown at the flying swarm has whitened those bees only which happened to be in the lower half of the swarm, leaving those in the upper half free from flour.

If the bees still go on flying hither and thither in an irregular manner, the floury bees will be found in continually increasing propor-

tions in the upper part of the swarm, till they have become equally diffused through every part of it. But the reason of this diffusion is not because the bees were marked with flour, but because they are flying about. The only effect of the marking is to enable us to identify certain bees.

We have no means of marking a select number of molecules of air, so as to trace them after they have become diffused among others, but we may communicate to them some property by which we may obtain evidence of their diffusion.

For instance, if an horizontal stratum of air is moving horizontally, molecules diffusing out of this stratum, into those above and below, will carry their horizontal motion with them, and so tend to communicate motion to the neighboring strata, while molecules diffusing out of the neighboring strata into the moving one will tend to bring it to rest. The action between the strata is somewhat like that of two rough surfaces, one of which slides over the other, rubbing on it. Friction is the name given to this action between solid bodies ; in the case of fluids it is called internal friction or viscosity.

It is, in fact, only another kind of diffusion—a lateral diffusion of momentum, and its amount can be calculated from data derived from observations of the first kind of diffusion, that of matter. The comparative values of the viscosity of different gases were determined by Graham in his researches on the transpiration of gases through long, narrow tubes, and their absolute values have been deduced from experiments on the oscillation of disks by Oscar Meyer and myself.

(*Continued in No. 3.*)

A CHILD WITH TEETH IN ITS NOSE.

The Troy *Press* says : "A domestic at work for Thomas A. Knickerbocker, No. 88 First Street, has a child whose case is somewhat remarkable. The mother, when pregnant, attended a lady to a dentist's, and witnessed the extraction of a number of teeth. The spectacle made a vivid impression on her mind, and affected the unborn child. The infant is now five months old, small of its age, and with a somewhat flattened forehead and sunken nose. The nostrils are diminutive, and the head has an internal gathering. But, strangest of all, the gum has been formed so high that several teeth which grew from it occupy the nasal cavities and impeded the little creature's breathing. Lately the child has been operated on by Dr. Gregory, of West Troy, for the removal of the teeth, and two were drawn out of the nose with difficulty,

after the child had been kept under the influence of chloroform for an hour and a half. One tooth previously loosened of itself, and was sneezed out. Another is visible, and must be removed by dentistry if nature is slack. The teeth are of moderate size, shelly in character, and do not appear very strong.—*British Journal of Dental Science.*

LETTER FROM A PICKPOCKET TO HIS VICTIM.

FRIEND JOHNSTON: In looking over some literary scraps, I find an amusing letter addressed to Dr. Chas. H. Roberts, of Poughkeepsie, which suggested to me that it might contribute to the amusement of the readers of your new journal, and accordingly present it for your consideration. It strikes me that it is a pithy, amusing, and well-arranged production, and may serve as a warning to some other brother who may propose coming to the city; for—*nuf ced.* W.

Let me give the letter:

New York, Jan. 5, 1858.

CHAS. H. ROBERTS, M. D.: DEAR SIR—I had the pleasure of relieving you of your pocket-book on the evening of the 2d, in a crowd at the Academy of Music. I presume you soon became aware of your dispossession, and have, perhaps, had some anxiety as to the application of the funds it contained. At once, let me say that you have my assurance that they have fallen into appreciative hands, and that every cent will be applied in gratifying the tastes and fancies of a fellow being whose ambition soars higher than his calling.

Now, Doctor, you must not flatter yourself with the mistaken idea that you have my personal acquaintance, from the fact of my favoring you with this correspondence—no, no; so divest yourself of that ambition! I simply write you in accordance with the established law of "honor among thieves," and in the fulfillment of the justice due you, I return to you (post-paid), the two enclosed pieces of paper, which are of value to you, and worthless to me—one being a note payable to your order (not yet endorsed), and the other a formula (unquestionably a good one), for making teeth, neither of which can ever be available to me, as my present employment probably pays better, it being principally cash; besides, it is a business more pleasing to my peculiar tastes.

From the date of the note I concluded you had been in town several days, which, by the way, may account for the lightness of your purse. Here allow me to add, Doctor, that a proper respect for gentlemen of my calling demands that you should not be so inconsiderate as to allow

your purse to become so low. Forty-five dollars! Why, Doctor, must I shame you? Really, it is hardly up to the average of ordinary collections.

Again, Doctor, I am pained to say that I have reason to protest against gentlemen of your standing carrying uncurrent money, and it is under serious consideration that I return to you the $5.00 on Morris County Bank, N. J., which I find at considerable discount. The six fives on the Poughkeepsie banks, you will be pleased to hear, go current, whilst the few smaller bills accompanying them can be easily disposed of by a person of my unabstemious habits.

From the name and the receipt which I found in the pocket-book, I concluded that you are the well-known dentist who long since did me satisfactory service in your line of business, while pursuing my avocation in Poughkeepsie.

Now, Doctor, I pray you will not consider it New York hospitality to extract purses in return for teeth; but remember that all are commanded to do something for a living. In accordance with this injunction, I must give you credit by saying that you were following your avocation on me, whilst I must modestly add that I was acting in the accomplishment of the same upon you, when you were visiting our city on the 2d ultimo; and, by the by, the thought suggests itself to me, at this moment of my writing you, that these cases in question afford to us a fair example of the comparative profits of our business. You spent much time and received a small fee, whilst my operation was one of a moment!

When I consider this difference, and, too, the gentle manner in which you attended to me, my good Doctor, I am inclined to return your purse and its contents; but that would be unprofessional; besides, it would involve a serious loss of time on my part, for such crowds do not occur every day, even in New York. Be assured, however, that had I recognized you, I should certainly have spent the time appropriated to you upon some other individual.

That I did not recognize you, I ascribe to what seems to be the fact, that when you come to the city you dress up in your best, and so look very different from when you are attending to business at home.

This little lesson, Doctor, which I have cheerfully demonstrated and do hereby gratuitously present to you, may sometime be of service to you, and perhaps convince you that pocket-books are not safe in crowds; and as a warning, let me say that if you are ever caught in one again, *let your vigilance be directed to your purse in proportion to its dimensions.*

Yours, INCOG.

NOTES.

A correspondent opportunely sends us the following letter:

Portland Me., Jan. 17th, 1874.

EDITOR OF DENTAL MISCELLANY.

DEAR SIR: The case of the Goodyear Dental Vulcanite Co., against Daniel H. Smith, of Holyoke, Mass., for infringement of the Cumming's Patent, came to a final hearing before Judge Shepley, of the U. S. Circuit Court for the First Circuit, in this city, on the 14th, 15th and 16th insts. This case was begun by suit against Dr. Smith, on the 14th of June, 1873. Counsel for the Vulcanite Co. were Messrs. Edward N. Dickerson and Benj. C. Lee, of New York, and for the defendant, Jeremiah S. Black, of Washington, Henry Baldwin, Jr., of Philadelphia, and Messrs. Jewell, Gaston, Field and Shepard, of Boston.

By stipulation between the counsel, other suits pending in the States of New Hampshire, Massachusetts, New Jersey, Delaware and Pennsylvania are to abide the result of *this* case. Undoubtedly the result will be that an appeal will be taken to the U. S. Supreme Court, whatever the decision in the Circuit Court may be. The case was opened for the plaintiffs by Mr. Lee, who occupied the entire session of the court on the 14th inst. in reading his brief, which, after setting forth at length the claims of the Company, as indicated in their bill, and an ingenious attempt to explain away their collusive action in the "Gardner case," was designed to show the court that Mr. White, and not Dr. Smith, is the defendant in the case. The Judge put a quietus upon this claim by announcing Dr. Smith as the defendant. Mr. Baldwin followed for the defendant, in an able and exhaustive argument, occupying the sessions of the court on the 15th and 16th insts.

It was a powerful elaboration of the defense set up in the answer and proven by the voluminous testimony for the defense, and a concise statement of the questions of law involved. He called the attention of the court to the fact, as proven by the witnesses for the plaintiffs, that it was impossible to make a dental plate according to the original specification upon which the patent was granted, and claimed that the re-issue was invalid because it unlawfully enlarged the specification. One interesting fact shown was that the Company continued to license dentists, to the number of many thousands, under the Goodyear Patent, after that patent had expired. Mr. Baldwin closed by reading an able paper, addressed to the court from Judge Black, who was unavoidably detained in Washington upon an important case.

Mr. Dickerson closed the case in a brief argument. He rested his entire case upon the claim that the patent is valid because it was granted for a "new article of manufacture."

The Judge took the papers, briefs, exhibits, etc., and reserved his decision.

Very truly yours,

JUSTITIA.

POSTAGE ON PACKAGES OF MERCHANDISE.

It is now the practice of the Post Office Department *to allow no writing whatever* on the outside of any parcel sent by sample post, excepting the name and address of the party to whom it is sent.

The words "Dentist," or "Dental Materials," unless printed, are by the office decided to subject the parcel to let-

ter postage, and this (if not prepaid), is charged at the place of destination.

Appended are portions of the law, which pertain to sending of small parcels of merchandise.

NEWSPAPERS, BOOKS, MERCHANDISE, SEEDS, &c., EACH 2 OZ.

Newspapers, circulars and other printed matter, (except books), seeds, cuttings, bulbs, roots and scions, in packages not exceeding 4 lbs. in weight........ 1 ct.

Books, in packages not exceeding 4 lbs. in weight...................... 2 cts.

Merchandise and samples, in packages not exceeding 12 oz. in weight ... 2 cts.

Newspapers, circulars, periodicals not exceeding 2 oz. in weight, deposited in letter-carrier offices for local delivery, 1 ct. each.

Periodicals exceeding 2 oz. in weight, deposited in letter-carrier offices for local delivery.....................2 cts. each.

All matter not prepaid at letter rates must be so wrapped that it can be examined without destroying the wrapper, and must not contain any writing whatever, inside or outside, except the address, but samples may be numbered to correspond with the numbers in a descriptive letter, and a business card may be printed, impressed, or pasted (if printed) on wrappers.

Liquids, poisons, explosives and other dangerous matter are excluded.

THIRD CLASS.

[NOTE.—Packages of mailable matter of this class must be prepaid by stamps, and must not exceed the weight prescribed by law (which is *twelve ounces*, except in the case of books and other printed matter, and except packages of cotton, woolen and linen clothing sent to non-commissioned officers and privates in the army.) All packages exceeding the prescribed weight are subject to letter postage.]

All matter of the third class must be fully prepaid.

On pamphlets, occasional publications, transient newspapers, magazines, and periodicals, hand-bills, posters, sheet-music, unsealed circulars, prospectuses, *book* manuscripts and proof sheets, printed cards, maps, lithographs, prints, chromo-lithographs and engravings, seeds, cuttings, bulbs, roots, and scions—1 CENT FOR EACH TWO OUNCES OR FRACTION THEREOF—weight of package limited to *four pounds*.

On flexible patterns, samples of ores, metals, minerals and *merchandise*, sample cards, phonographic paper, letter envelopes, postal envelopes and wrappers, unprinted cards, plain and ornamental paper, photographs, and all other articles for which other rates of postage are not prescribed in this table, and which are not by law excluded from the mails—2 CENTS FOR EACH TWO OUNCES OR FRACTION THEREOF—weight of packages limited to *twelve ounces*.

On books—2 CENTS FOR EACH TWO OUNCES OR FRACTION THEREOF—weight of packages limited to *four pounds*.

PRIZE ESSAYS.

The Prize Essay Committee, who will examine the competitive essays on Rubber Dam, and will award the prize offered for the best article on that subject, consists of Drs. S. C. Barnum, A. L. Northrop and William A. Bronson, these gentlemen having kindly consented to act in this capacity.

The essays on Rubber Dam will be submitted to them on the 10th inst., and their report and award announced in our next issue. We hope for a number of interesting and instructive papers on this important subject.

We expect to offer prizes for essays upon other subjects, in the March issue of the DENTAL MISCELLANY.—EDS.

THE

Morrison Dental Chair.

Price, $150.00. Boxing, $5.00. Spittoon Attachment, $8.00.

It possesses great superiority over any chair before offered to the profession, and is at the same time less expensive than any other first-class chair. Some of its points of superiority we here enumerate :

1st. All the advantages of any low-based chair, and also of any high-based chair, are here secured in a single chair. In it the patient can be placed lower than in the lowest-based chair made, or higher than in any other of which we have knowledge. At its lowest position the seat is fifteen inches, and at its highest position forty-two inches above the floor.

2d. The operator using the Morrison Chair can either stand or sit at his work, as he may choose, working with equal convenience in either position.

3d. It has been a very general complaint that dental chairs are too wide at the back, so holding the operator away from his work. Here this difficulty is overcome. The chair is narrow at the back, so that the operator need not stretch to reach the patient, but *can lower either arm of the chair out of the way* and so be as near the patient as he may choose.

4th. It can be changed from its lowest to its highest position in seven seconds—a celerity impossible in any chair raised by a screw.

5th. It can be very readily and perfectly adapted to operations on children of any age

First. Because in it the child can be raised as high as needed for the tallest operator.

Second. It provides a comfortable back and head rest, exactly as for grown persons.

Third. The footstool can be lengthened or shortened, to suit children of any size.

6th. The back of the chair can be lengthened or shortened rapidly and at will.

7th. The lower part of the back can be thrown forward to support the small of the patient's back.

8th. The chair, when adjusted to any position, is firm or steady wherever placed, and this is *especially true of the head-rest.*

9th. It occupies less room than any other operating chair.

10th. Although the footstool, when at its extreme length, is much longer than any other made, yet a person of ordinary weight can stand on its extremity without tipping the chair.

Nota Bene.—We have substituted brass cogs and castings, for those that experience has shown in any degree faulty, and the chair, *as now sold, is as strong as any chair made.* Reference is made to this because several of the chairs first sent out, failed in the cogs by which the chair is raised, and in the castings which throw the lower back-pad forward. These have been replaced in every instance with brass cogs, without charge on our part, and to the complete satisfaction of the purchaser.

We are gratified in being able to refer to the commendations, which follow, from some of the leading practitioners of the country.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

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10 W. 11*th St., New York, July* 24*th,* 1873.

MESSRS. JOHNSTON BROS., Broadway :

I find your Morrison Chair gives great satisfaction. My patients all admire, and voluntarily pronounce it the easiest they ever sat in. The movable back-piece, arms and foot-rest, which latter the patients can adjust at pleasure without changing their position, the lowering of the whole chair, which admits stepping into it without the slightest inconvenience, are points which call forth immediate praise from the patients, and give great satisfaction to the operator.

As a child's chair it is invaluable ; the little patients can be "put just where you want them," while the operator can with ease change the position of the *whole* chair, without disturbing the patient in the least. These points, combined with others which it has, make this chair the most desirable of any which I have seen. Very respectfully yours, A. L. NORTHROP.

JOHNSTON BROS., *Hartford, June,* 15*th,* 1873.

GENTLEMEN : I have used the new Morrison Chair several hours every day since its arrival here, and feel in duty bound to say that there is no chair manufactured that can compare with it.

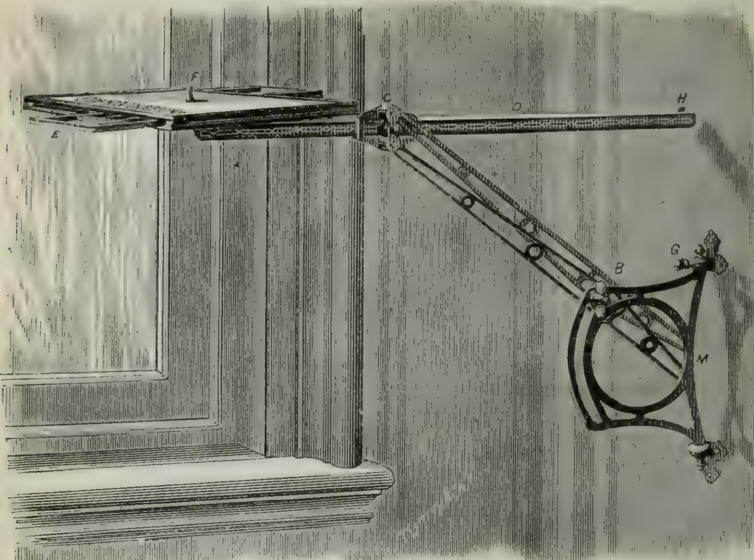
Its adaptability to children as well as adults, support for the small of the back—in fact, all its motions are perfect, and I see no chance for improvement. Dr. Morrison and yourselves have my heartfelt thanks for the great benefits you have conferred upon the profession in perfecting the chair as well as the Dental Engine. Very truly yours, GEO. L. PARMELE, M.D., D.M.D.

MESSRS. JOHNSTON BROS., *Hartford, July* 24*th,* 1873.

DEAR SIRS : The Morrison Chair meets all my expectations. I like it very much ; in fact, I feel perfectly satisfied that I have one of the most complete chairs yet made for the comfort of patients and the convenience of the operator.

Yours truly, JAS. McMANUS.

MORRISON DENTAL BRACKET.



Price, $25.00. Boxing, $1.00.

The cut represents the table in its highest position, and distant from the wall a little more than half the distance it is capable of taking. By loosening the thumb-screw B, and allowing it to rest in the bottom of the slot, (instead of at the top as represented here,) the table will occupy a position as much below M as it now does above the same point. The extreme range, that is, the distance between the table when at its highest and its lowest position, is 24 inches.

M represents a metal frame which is secured to the wall or other support by screws. It swings from side to side as a gate on its hinges. C. M. represent light but strong metallic arms, hinged at M as a centre and moving up or down. At B is a thumb-screw passing through a slot in the frame M. By it the arms can be firmly clamped at any desired height.

At C is a slide-rest through which the hollow rod D passes freely, and may be clamped at any distance from its ends. At one end of this bar a square table is supported, having in it foil and instrument drawers. This table is capable of rotation round F, which is the burner of an alcohol lamp, the alcohol being contained in D and introduced at its further extremity H. Among the advantages of this bracket are these:

1st. It combines a greater variety of range and movement than any other.
2d. It is rigid in whatever position it is clamped, and will hold 15 lbs. with steadiness.
3d. It provides a clean receptacle for foil and instruments.
4th. It is obvious that a square table is very much more convenient as an instrument stand than a round one.
5th. Its drawers extend through the table and can be opened from either side.
6th. To those having a Morrison Chair it is almost indispensable, as it will follow the chair to either its lowest or its highest position.

It is handsomely ornamented and nickel-plated throughout, so that it is a very beautiful addition to the furniture of the operating room.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

Morrison Dental Engine.

Elliott or Suspension Dental Engine.

MANUFACTURERS' ANNOUNCEMENT.

It is known to many of our friends, that we have expected to manufacture and sell the Elliott or Suspension Engine, and that we have been engaged in preparing tools for this purpose. While doing this our attention was called to several defects in it, and to various plans for avoiding them. Led on in this way, we have found that *both* engines can be *very greatly improved*, and have decided upon the patterns of the new engines. That nothing may be left undone towards speedily producing Dental Engines superior to any yet made. (even of our own manufacture), we have secured the services of Dr. J. B. Morrison, and have put at his disposal all the aid he asks, both of machinery and men.

Later—Jan. 15th.—The improvements devised by Dr. Morrison are very decided, and will leave nothing more to be desired. In order that we may have time to perfect all the details of the manufacture, we deem it prudent to make no promises to supply either engine earlier than March. The Morrison Engine will first be ready, and orders booked in February can most probably be filled the following month.

JOHNSTON BROTHERS.

STEEL INSTRUMENTS.

FORCEPS—Octagon, and Oval Joints,

PLUGGERS—Varney's, and other patterns,

PLUGGER POINTS, for Automatic Mallets,

BURS, DRILLS, CHISELS,

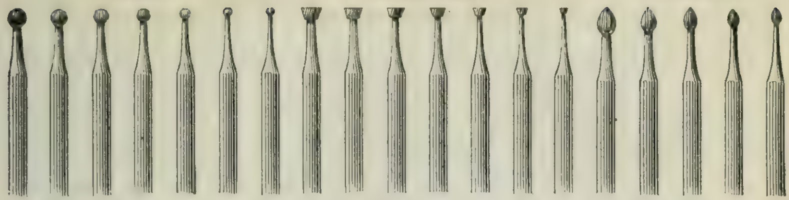
EXCAVATORS, NERVE INSTRUMENTS,

In all varieties, constantly on hand and for sale.

JOHNSTON BROTHERS.

CAVITY INSTRUMENTS.

ROUND. INVERTED CONE. BUD SHAPED.



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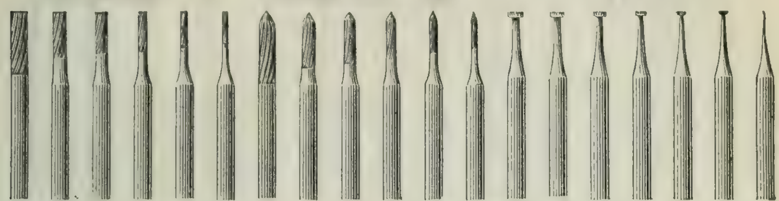

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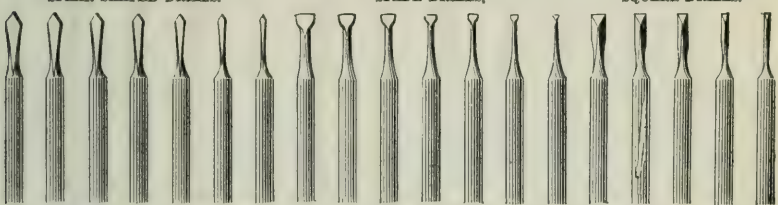
SPEAR SHAPED DRILLS. SPADE DRILLS. SQUARE DRILLS.



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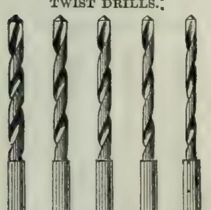
TWIST DRILLS.



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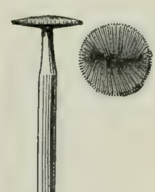


Price, $1.25.

CAVITY INSTRUMENTS FOR RIGHT ANGLE ATTACHMENT.

We have in stock, and can furnish *Cavity Instruments* for the *Right Angle Attachment*, of all styles and sizes, from Nos. 100 to 218, inclusive.

SCOTCH STONES, MOUNTED.

The Scotch Stones enable the operator to give a finish to fillings hitherto unattainable, and only need a trial to be appreciated. We have these in stock of forms Nos. 75, 77, 80 and round. Other kinds of stones are now in process of manufacture.

HINDOOSTAN STONES, MOUNTED.

Forms of Nos. 75, 77, 80, and round. Of each shape we make three sizes. The cuts referred to by the numbers represent the large size. These are, beyond doubt, of the greatest utility in cutting either gold or bone. They last longer than any other stone.

LEATHERS, MOUNTED.

We have in stock Leather Points mounted on Mandrils, of forms Nos. 75, 77, 80 and round, designed to be charged with powders, for polishing and finishing fillings.

Screw Mandril, to be armed with leather, wood, etc., for polishing fillings, cleaning teeth, finishing plates, etc.

PRICES.

Finishing Burs,	Per dozen,	$6 00
Stoned Finishing Burs,	Each,	1 00
Cavity Instruments and Screw Mandril,	Per dozen,	3 00
Stoned Cavity Burs,	Each,	50
Right Angle Cavity Instruments,	Per dozen,	3 00
Leathers, Mounted,	"	3 00
Hindoostan Stones, Mounted,	"	6 00
Scotch Stones, Mounted,	"	3 60
Burnishers,	"	9 00
"	Each,	0 75
Corundum Points, Mounted,	Per dozen,	1 50
" " not Mounted,	"	0 75
Bands for Engine,	"	1 50
Twist Drills	Each,	40

IN ORDERING INSTRUMENTS DESIGNATE THEM BY THEIR NUMBERS, AND STATE WHETHER THEY ARE WANTED TO FIT THE OLD OR NEW STYLE HAND PIECE.

Especial attention is called to our burnishers. They have been most cordially endorsed by our most prominent operators.

Purchasers of the new style improved hand piece will have all of their old stock of burs fitted to the new hand piece, free of charge, by sending them to us either by mail or express.

☞ Our instruments are all made of the best Stubs' steel. We shall spare no effort to make them equal in every respect to anything offered to the profession.

☞ We are constantly adding new forms and sizes of Plug Finishing Burs, Cavity Instruments, Drills, etc.

DIRECTIONS FOR USING THE ENGINE.

1. In lifting the engine, be sure *not to bend* the arm which carries the hand piece.

2. Whenever the least noise is heard, oil the engine with the best sperm oil. The rapidity of motion renders oil a necessity.

3. The only part at all likely to break, is the small spring, which conveys power at the upper end of the hand piece. It is not soldered to the shaft, but is slipped on by hand. To put on a new spring, take hold of it near the end opposite that you apply to the shaft, and twist as if to *uncoil* the spring, at the same time pushing the spring on to the shaft. You will be greatly aided in removing the broken parts, by twisting, as if to uncoil, the spring. A piece of emory paper will be found convenient to aid in holding the polished shaft.

4. The engine, to run satisfactorily, should be oiled daily ; and the driving-spring should be perfectly straight.

IMPROVED INSTRUMENTS.

We have added to our list three new and very popular sizes of Cavity Burs. One round called 106½, one inverted cone called 113½, one wheel-shaped called 137½. Each is smaller than any before made by us, of its shape. These numbers are neatly put up in dozen and half dozen packages, and are completely protected from oxidation and from rubbing against each other in transportation.

They are very popular, and we frequently receive orders from dentists for from one to three dozen of each.

STONED BURS FOR BURRING ENGINES.—For some time past, we have made to order, a Bur for use in Burring Engines, by the following process: The teeth of the Bur being laid out with extreme accuracy, are filed to *exactly the same length,* but are not brought to a cutting edge. The Bur is now tempered, and each tooth *afterwards stoned to a fine edge.* This secures a Bur perfect in all its cutting edges, and unequaled by anything hitherto offered in the market. Of these we are provided with a limited supply, of both Cavity and Finishing Burs, excepting Fissure *Burs.* (See Price List.)

Thin Boxwood Discs for carrying Polishing Powder, to polish fillings in proximal cavities. These are of four sizes, from ⅝ inch to 1 inch diameter.

We add that the Instrument-stand, elsewhere illustrated, will be found very useful for the convenient keeping of the Engine Instruments while not in actual use.

Besides the form represented in the cut, we have them with smaller holes, and very many more of them, so that each Bur may be kept by itself.

We invite the fullest examination of our Engine Instruments, as regards

The quality of the steel from which they are made.

The shape and finish of the cutting edge.

Their temper.

The rapidity with which they cut.

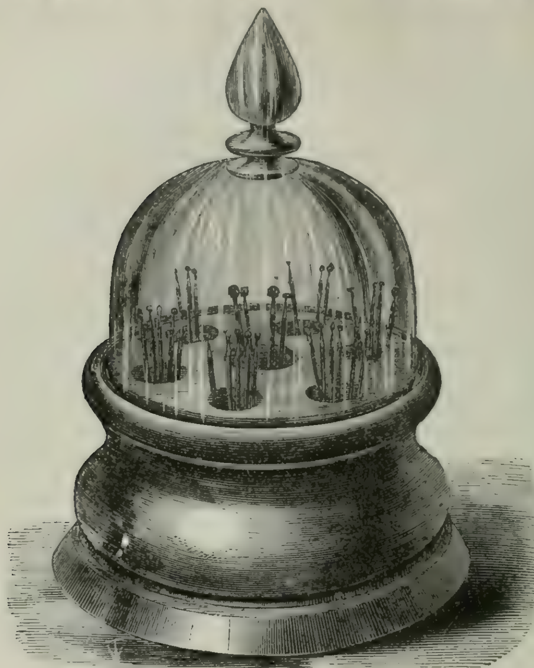
Their durability.

The shaft of each instrument is *round and highly finished,* and can therefore be used without unreasonable and unnecessary injury to the nose of the hand-piece, which injury occasions unsteadiness in all the uses of the Engine.

They will *bear* examination in *quality* and *price.*

JOHNSTON BROS.

INSTRUMENT STAND FOR ENGINE BURS.



Price, $2.50.

No. 1 as above. No. 2 with many more, but smaller holes.

This is made of rosewood and maple in alternate layers, and is very ornamental. Besides the form shown above, we have another like this in all respects except that the holes into which the burs are placed are made so small as to hold only one or two instruments in each. We call this No. 2.

JOHNSTON BROS.

CARVACROL. C.^{20} H.^{14} O.^{2}

HIGHLY RECOMMENDED.

PROPERTIES:—Locally applied, Carvacrol, in full strength or diluted, seems to possess antiseptic, disinfectant, sedative, mildly caustic and escharotic, gently styptic, stimulant, irritant and rubefacient properties.

Carvacrol, as a substitute for Glycerole of Thymol and Creosote or Carbolic Acid, in cases of Odontalgia, Sensitive Dentine, Alveolar Abscess, "Canker Patches," etc., may be locally employed in the same manner.

As a gargle for Tonsillitis and inflamed mucous membranes, it may be employed in the proportion of about three drops to the ounce of water, or the strength can be increased when more powerful action is required.

Price per Bottle, $1.00.

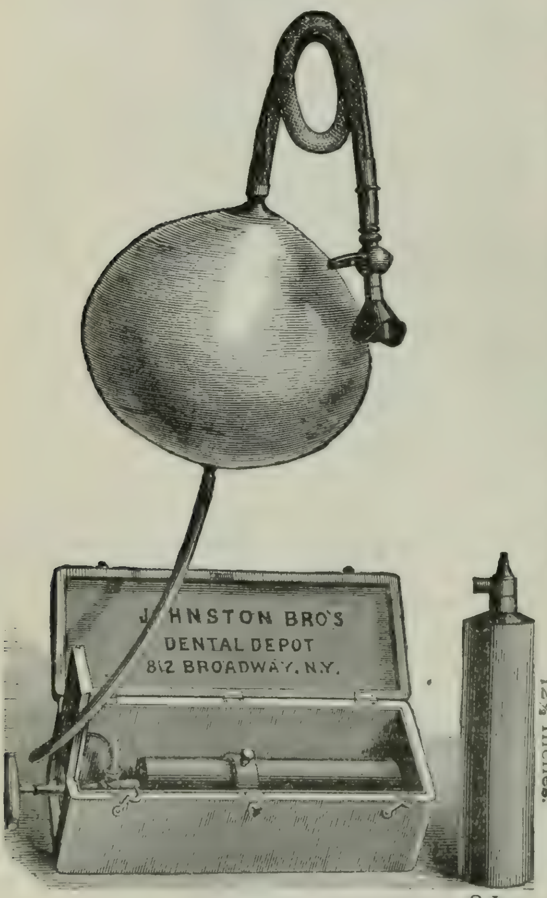
H. L. SAGE, D.D.S.

For Sale by JOHNSTON BROS.

LIQUID NITROUS OXIDE.

[Revised Circular.]

The increased and still increasing demand for Pure Liquid Nitrous Oxide, and for information concerning apparatus for its exhibition, renders it necessary that we issue yet another edition of our circular upon that subject As the Surgeon's Case, as first introduced, has proved itself in every way all that we could wish it to be for the place assigned to it, we cannot do better than to repeat here our first description of it.



SURGEON'S CASE.

This comprises a strong cylinder containing One Hundred Gallons of Gas; a strong morocco covered case, provided with an iron ring and set screw, by which the iron cylinder is held in place during use, and its delicate valve protected from injury; also, a rubber bag with rubber tube at one end for admission of gas, while an inhaling tube, handsomely covered on its outside, and provided against any possibility of a collapse by a tin-coated spiral of wire on its inside, is fastened at its opposite end—an inhaler—a nickel-plated wrench and a nickel-plated key. In fact, *all* the apparatus necessary for administering the gas. The whole case and contents weighs about fifteen pounds. This is here shown as open, and the bag which receives the gas from the cylinder, and from which it is exhibited to the patient, is represented as filled, and suspended above the case. The cylinder is also shown as standing at the side of the case. This is the simplest and most popular form of apparatus, and will be everywhere welcomed —because of its portability for use outside of the operating room.

The first letters of recommendation we published are of so cheerful and enthusiastic a character, that we cannot feel satisfied to lay them aside. We, however, add a few of more recent date. The more we examine the statistics of anæsthetics, the more thoroughly are we convinced that whether we would suit the real interest of either surgeon, dentist or patient, no other anæsthetic should be used.

One single argument in favor of Chloroform and Ether over Nitrous Oxide can be adduced—they are cheaper.

Per Contra—examine the evidence below.

From a careful examination of the statistics of 200,893 cases, Prof. E. Andrews gives, in the *Chicago Medical Examiner*, the following estimate of the relative danger from different anæsthetics:

Sulphuric Ether	1 death to	23,204	administrations.
Chloroform	1 "	2,723	"
Mixed Chloroform and Ether	1 "	5,588	"
Bi-chloride of Methylene	1 "	7,000	"
NITROUS OXIDE	**no Deaths in**	**75,000**	"

[*Dental Cosmos.*

Edward R. Squibb, M.D., than whom our country has no more able pharmaceutist and toxicologist, in a lecture on anæsthetics before the Medical Society of the State of New York, says: "Nitrous Oxide was the first anæsthetic; and the safety and certainty of its effects, even in inexperienced hands, for all momentary operations, and the promptness with which persons recover from its use, render it perhaps the most important of all anæsthetics, because destined to relieve a greater aggregate amount of pain, *with greater safety*, than any other agent."

Again—"If the surgeon considers the safety and saving of pain to his patient first, and his own convenience in operating, second, he will hesitate before passing over such an agent as Nitrous Oxide."

It may be well just here to call attention to the fact that, when ether or chloroform is administered, it is not at all uncommon for the air about the patient to become so charged with the vapor as to somewhat affect the surgeon, taking from him perfect clearness of mental operation, and of the senses, and frequently leaving him with headache, and even nausea.

When Nitrous Oxide is given, nothing of this occurs, and the surgeon is in no way conscious of the presence of the anæsthetic, except as he sees its effects on his patient. This, we think, is a convenience to the surgeon.

Numerous and repeated trials of the Liquid Nitrous Oxide in capital operations in surgery, (as well as in momentary operations), during the two years just passed, attest the perfect adaptability of this agent to all cases where an anæsthetic is needed, and the time will not be very distant when it must supplant the use of its cheaper, but dangerous rivals.

Why Nitrous Oxide should be preferred to Ether or Chloroform.

1*st*. It is far safer—see statistics above. Dr. Colton reports having administered it to thousands of patients, without a single accident.

2*d*. It acts quickly; from one to two minutes being generally sufficient to bring a person completely under its influence.

3d. It seldom excites a patient to violence—a matter of great importance.

4th. Nausea is not often excited, even during a long operation. Eating, however, should not immediately precede the administration of the gas. It is contended by some operators of large experience, that *pure* nitrous oxide *never* causes nausea. In operations of the eye, or in the pelvic region, this peculiarity renders the gas invaluable, and it always is of much value to the patient's feelings.

5th. The shock given to the system by other anæsthetics, is almost as severe as the operation itself, and a slow return to consciousness and the normal condition detrimental to the recovery of the patient. Nitrous Oxide frees itself from the system as speedily as it produces its effects, and so adds nothing to the perils of surgery.

6th. It is no small advantage, as before recited, that, while using Nitrous Oxide, the operator feels no inconvenience from its effects, as he does not inhale it, while he cannot altogether escape the fumes of ether or chloroform.

We append a few Letters and Extracts from Letters received from those who have tried the apparatus.

JOHNSTON BROS. *New York, October* 13, 1871.

MY DEAR SIRS:—This afternoon I used the LIQUID NITROUS OXIDE you sent me, in an operation by Dr. J. Marion Sims, in presence of Drs. J. C. Nott, Walker and Nicoll. I have produced anæsthesia rapidly, and *kept it up for fifty* (50) *minutes without intermission*, to the great delight of us all. This is probably the first time in America (possibly in the world) that anæsthesia has been kept up for this length of time with Liquid Nitrous Oxide Gas. I expect to use it again in a few days, in a case of ovariotomy. Please send me a charged cylinder and face-piece. Yours truly,

D. H. GOODWILLIE.

Extract from Letter of Dr. J. Marion Sims.

267 *Madison Avenue, New York, Jan* 25, 1872.

Messrs. JOHNSTON BROS.

Since last September, I have performed a great many operations on patients under its (Liquid Nitrous Oxide) influence. Many of these took the gas for 20, 25, 30 and 35 minutes. One took it for (50) fifty minutes, and I saw no reason why she could not have safely taken it for twice that length of time. Dr. Goodwillie has given the gas to two ovariotomy cases for me, one for 27 minutes, the other for 31 minutes. In these it was all that I could wish.

Truly Yours, J. MARION SIMS.

Hopkinton, N. Y., March 18, 1872.

Messrs. JOHNSTON BROS.

I have again exhausted my cylinder, which I received January 10, and I have drawn out 28 doses. I have heard the complaints of cylinders not holding out, but I think they do not shut them tight. I have now had three cylinders, first one had 25 doses; second, 24, and not all out; third, 28 doses. Enclosed please find cylinder to re-fill, and $6.

Yours truly, J. A SHELDON.

Hopkinton, St. Lawrence Co., N. Y., January 20, 1873.

Messrs. JOHNSTON BROS.

I would cheerfully say a few words in favor of your Liquid Gas apparatus. I have taken it after keeping it four months, and again as soon as the bottle was received, and could see no difference, only I thought that the old was the strongest. I have practiced taking it for the last ten years, and one week ago to-day, I gave a single dose, and extracted 23 teeth and roots, with no symptoms of pain until the last one, and had it not been for the blood, I would have got the remaining 1 tooth and 2 roots.

Truly yours, J. A. SHELDON, D.D.S.

Messrs. JOHNSTON BROS. *Reading, October* 17, 1872.

DEAR SIRS:—Enclosed find $25, which place to my credit; the balance will be forthcoming shortly. The cause of my not having used any Liquid Gas lately, is that I have been considering the expense, trouble, etc. I have now concluded to use it altogether, as I find it more satisfactory both to myself and patients.

Please send me at once this bottle re-filled.

Yours respectfully, F. HICKMAN.

JOHNSTON BROS. *Red Bank, N. J., December* 18, 1872.

SIRS:—I have used several bottles of your Liquid Nitrous Oxide Gas. I have not only administered it to my own patients, but in several surgical operations performed by Dr. G. F. Marsden, when anæsthesia was kept up from one to fifteen minutes with perfect success. *I have not had a single case in which it was not successful.*

Respectfully, CHAS. H. WHITE.

Messrs. JOHNSTON BROS. *Trenton, April,* 1873.

SIRS:—Please send Cylinder of Gas as soon as possible. Yesterday I administered it successfully for quite a serious surgical operation, keeping the lady under the influence near twenty minutes. Surgeon from your city.

Yours, CHAS. DIPPOLT.

Wallingford, Conn., April 24, 1873.

Messrs. JOHNSTON BROS.

GENTS:—Herewith please find empty cylinder. Please send me another charged with gas per return express if possible, and bill. I gave the last dose of gas the other contained the other day; it had been kept three months, and I found it good as new. Am very much pleased with the Surgeon's Case, and become more attached to it every day I use it.

Yours truly, JARED G. KIMBERLY.

JOHNSTON BROS. *New York, October,* 1873.

Please send us another "Cylinder of Gas" just as the last one, out of which we got over sixty-two (62) dollars. "This is cheapness indeed."

Yours, etc., M. P. B.

40 *Beaver Hall Terrace, Montreal, December,* 1873.

Messrs. JOHNSTON BROS.

DEAR SIRS:—I have been using Morrison Dental Engine and Bracket, as well as your condensed Nitrous Oxide, for some time. They suit me so admirably that I don't see how I could manage to get along without at least the former and the latter. Yours, W. GEO. BEERS.

REVISED PRICES.

Complete Apparatus—Surgeon's Case. . . . **No. 1.**	$40 00
Complete Apparatus—Surgeon's Case, with extra Bag and Metallic Inhaler. **No. 2.**	45 00

Boxing either, $1.00.

Each complete apparatus includes a 100 gallon cylinder, filled with Liquid Nitrous Oxide.

Cylinder with 100 gallons of Gas.	16 00
Refilling Cylinder.	6 00
Morocco covered case, with ring and thumb screw, velvet lined,	12 00
Polished bl'k walnut " " " " "	13 00

Of these latter we have only a limited number.

Rubber Bag, with covered inhaler tubing, (about 4 gall. capacity)	5 00
Rubber Bag, with covered inhaler tubing, extra size.	7 00
Inhaler, with spring valves, trumpet mouth-piece, with Plated connection.	8 50
Inhaler, latest style, with two way stop cock, adapted to the use of both dentists and surgeons, with connection.	9 50
Key, Nickel Plated.	1 50
Wrench, "	50
Union, Nickel Plated, (nut and tube), for connecting cylinder and gas bag.	1 50
Covered Inhaler Tubing, per foot.	50
Plated Connection to fit old style Inhaler.	1 00

REMARKS.

When the side of a bag has been perforated, it cannot be repaired, but should be replaced. Send on the tubing by mail, and the bag will be replaced. Price.	3 00

As this cannot be done *properly* except by the use of rubber cement, and by persons experienced in the business, we think it every way advisable that it be entrusted to the rubber workers, and not attempted by the dentist.

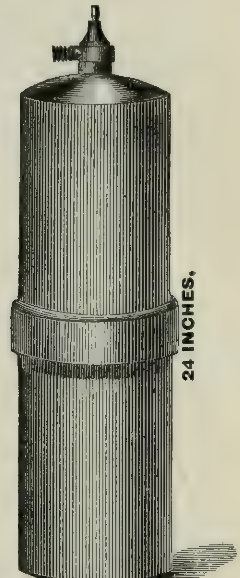
JOHNSTON BROS.,

812 BROADWAY, N. Y.

ONE THOUSAND (1000) GALLONS GAS,

LIQUID NITROUS OXIDE.

1000 GALLON CYLINDER CASE.
Price, $30.00. Boxing, $2.00.



1000 GALLON CYLINDER.
Price, $36.00.
Boxing, $1.50.

Gas in 1000 gallon lots, 4½ cents per gallon.

The above illustrated apparatus is especially desirable where large quantities of nitrous oxide are used, or where it must be sent a great distance. In this form it is best to ship it by *fast freight*—which makes the cost of transportation very light.

THE GAS CAN BE KEPT FOR ANY LENGTH OF TIME,

AND IS

CONSTANTLY ON HAND AND ALWAYS OF THE BEST QUALITY.

PRICE LIST OF A COMPLETE OUTFIT.

1 Black Walnut Paneled Case, octagonal	$30 00
2 1000 gallon Cylinders at $36 00	72 00
2000 gallons of Gas at 4½ cents per gallon, being 25 per cent. less than price in small cylinders	90 00
1 Bag, with covered Inhaler Tubing	5 00
1 Bag, extra size, with covered Inhaler Tubing	7 00
1 Key, Nickel Plated	1 50
1 Wrench, Nickel Plated	50
1 Union, " "	1 50
1 Inhaler—Metallic—with two way stop-cock and connection	9 50
	$217 00
Deduct Gas	90 00
Cost of Apparatus	$127 00

By purchasing under this plan a saving of 25 per cent. is effected in the cost of the gas, or on 2,000 gallons of $30.00.

It is right that we should here announce that we have in hand a piece of furniture, which—while it will answer the purpose of the black walnut case illustrated—will also serve as a stand for an ornamental Gasometer.

A cut of it will appear in an early issue of the DENTAL MISCELLANY.

As these large cylinders can easily be sent by fast freight (*the* 100 *gallon size is too small to be so risked*) cost of transportation is reduced to its lowest rate.

JOHNSTON BROTHERS,

812 Broadway, New York.

PORCELAIN TEETH.

Our stock is carefully selected from the factories of the BEST MAKERS, and embraces all of the varieties in use, including Continuous Gum Teeth. We will fill orders on short notice for any manufacture of teeth.

Dentists sending us their orders can rely on receiving prompt attention, and on getting manufacturers' best rates.

JOHNSTON BROTHERS.

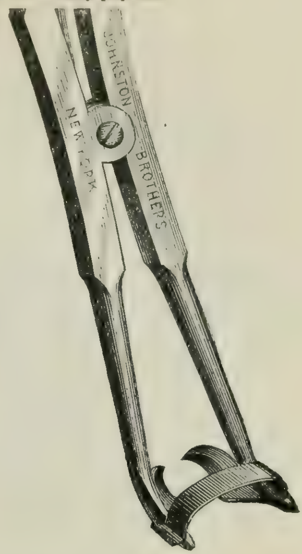
DENTAL GUM—RED.

Johnston Bros.' Nos. 1 and 2, per lb	$2 50
E. Dougherty's Nos. 1 and 2, per lb	2 50
American Hard Rubber Company's, per lb	2 50
Whalebone Rubber, per lb	3 50
Dental Gum—black—per lb	3 00
Gutta Percha, per lb	3 00

JOHNSTON BROTHERS.

RUBBER DAM CLAMP FORCEPS.

Of these we offer two styles, both deservedly popular.



POINTS OF DR. T. C. ROYCE'S

Rubber Dam Clamp Forceps,

Shown with Clamp. Handles are exactly like the other style, (Bowman's.)

Both styles of these Forceps have points accurately adapted to the shape of the clamp at the neck, and hence will be found much more convenient than those hitherto offered the profession in this point of adaptation. (See also advertisement of Clamps.)

If so ordered we can supply either style of Forcep with a band, which will keep the Forcep and Clamp extended and ready for use when the hand of the operator is removed, as shown on the Bowman Forcep.

PRICES.

Forcep, either style	$3.00
" " " Nickel Plated	3.50
" " " " " with band	3.65
Complete set of Clamps, embracing eight forms	4.00
Complete set of Clamps, embracing eight forms, plated	4.80
Clamps, each	50
" " plated	60

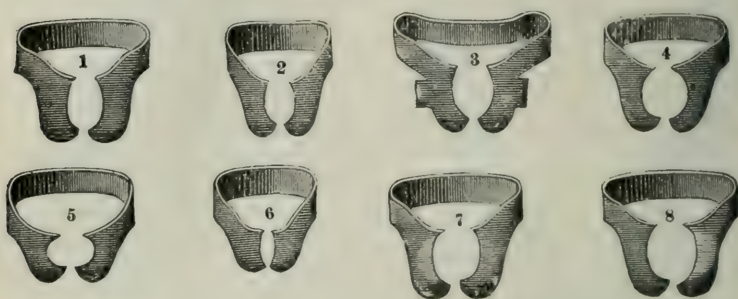
JOHNSTON BROS.

We were never more sure of doing signal service to the Dental Profession than now in offering the

IMPROVED
Rubber Dam Clamps,

INVENTION OF

DR. DELOS PALMER, OF NEW YORK.



Price, set of Eight, { **Oil finish, $4.00.** **Each plain, 50 Cents.**
{ **Nickel plated, 4.80.** **" Nickeled, 60**

For use with Rubber Dam Clamp Forceps.

These Clamps are designed to be placed on the tooth at the commencement of the operation. Afterwards apply the Rubber Dam by passing it over both tooth and clamp.

DESCRIPTION.

Nos. 1 and 2.—Universal Clamp for Molars.

No. 3.—For posterior cavities in molars standing alone.

No. 4.—For third molars, or any molar of a cone shape. This Clamp can oftentimes be turned around while on the tooth, so as to place the bow of the Clamp out of the way of the operator.

No. 5.—For biscuspeds.

No. 6.—For lateral and central incisors.

Nos. 7 and 8.—Rights and Lefts.—For cavities under the gum, on the buccal or lingual surface of molars.

Cuts of two favorite styles of Rubber Dam Clamp Forceps will be found on another page.

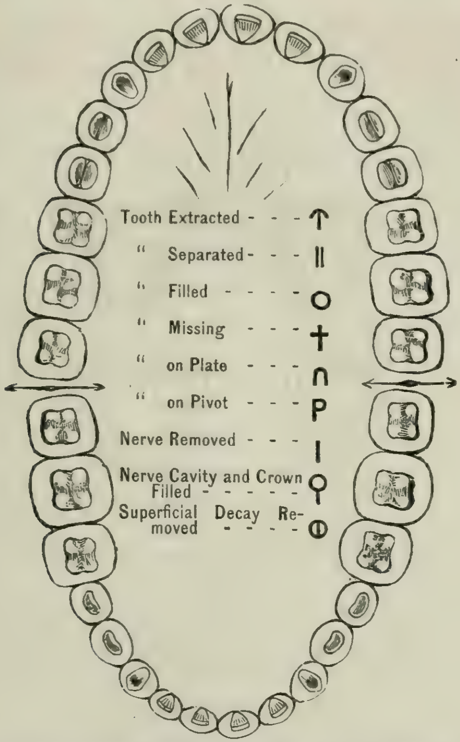
These Clamps have prominent points of marked superiority over those of other manufacturers.

First. Each has been carefully adapted to the shape of the tooth for which it is designed, *under the personal supervision of Dr. Delos Palmer*, the inventor.

Second. A groove is made by us in the clamp, into which the forcep nicely fits, so that the clamps firmly hold their position on the forceps, when once adjusted, instead of tilting from one position to another—as is the case when no groove is provided.

JOHNSTON BROS.

EXAMINATION TABLETS.



These are put up in Pads of 100 Each. Price 50 Cents.

Having this diagram of teeth on one side, and ruled for dollars and cents on the other, they will be found very convenient in making a diagram of any examination of a patient's mouth; or in sending to a parent an approximate estimate of the amount of work needed in a child's mouth.

JOHNSTON BROS.

NICKEL-PLATING.

Forceps, Foil Shears, and other Dental Instruments can be kept neat, with little trouble, if thoroughy plated with Nickel. Instruments sent us to be plated will receive immediate attention—be thoroughly plated and promptly returned.

JOHNSTON BROS.

NEW YORK COLLEGE OF DENTISTRY,

EIGHTH ANNUAL SESSION,

1873–74.

FACULTY.

WM. H. ALLEN, Emeritus Professor of the Institutes of Dentistry.

FANEUIL D. WEISSE, M.D., Professor of Regional Anatomy and General Pathology.

FRANK ABBOTT, M.D., Professor of Operative Dentistry and Oral Surgery.

ALEX. W. STEIN, M.D., Professor of Histology, Visceral Anatomy, and Physiology.

F. LE ROY SATTERLEE, M.D., Professor of Chemistry, Materia Medica, and Therapeutics.

C. A. MARVIN, D.D.S., Professor of Mechanical Dentistry.

J. BOND LITTIG, D.D.S., Adjunct Professor of Mechanical Dentistry.

D. W. WILLIAMSON, D.D.S., Demonstrator of Operative Dentistry.

A. RUST CUYLER, D.D.S., Demonstrator of Mechanical Dentistry.

C. F. W. BODECKER, D.D.S., Assistant to the Professor of Chemistry, etc.

Students may matriculate at any time, as the Infirmary is open, for regular students of the College to practice in, the entire year.

The regular course of Lectures will commence middle of October, 1874, and continue until the 1st of March. Three hours of each day of the week (except Saturday) will be devoted to lectures, and four hours to *Clinics,* and practice at the Chair, and in the Laboratory, under the direction of the Demonstrators.

The Infirmary consists of two large rooms, each seventy-five feet in length, with an excellent light to operate by, furnished with operating chairs and tables, all arranged to the best advantage for the more perfect instruction of students. Patients are usually in attendance in great numbers.

Tickets for one year's Instruction, including Course of Lectures, Matriculation, Demonstrators', Diploma Fees, and Practice in the Infirmary the seven and one-half months between the sessions....	**$150.00**
For the Course of Lectures only..........	**100.00**
Matriculation (paid but once)	**5.00**
Diploma Fees..........	**30.00**

Board may be obtained for from $4 to $8 per week.

For further information, address

FRANK ABBOTT, M.D., Dean,
78 West Twelfth Street, New York.

HARVARD UNIVERSITY.
Dental Department.
BOSTON, MASS.
1873-74.

FACULTY.

CHARLES WILLIAM ELIOT, L.L.D., *President.*
OLIVER W. HOLMES, M.D., Professor of Anatomy.
HENRY J. BIGELOW, M.D., Professor of Surgery and Clinical Surgery.
THOMAS H. CHANDLER, D.M.D., Professor of Mechanical Dentistry.
THOMAS B. HITCHCOCK, M.D., D.M.D., Professor of Dental Pathology and Therapeutics.
GEORGE T. MOFFATT, M.D., D.M.D., Professor of Operative Dentistry.
NATHANIEL W. HAWES, Assistant Professor of Operative Dentistry.
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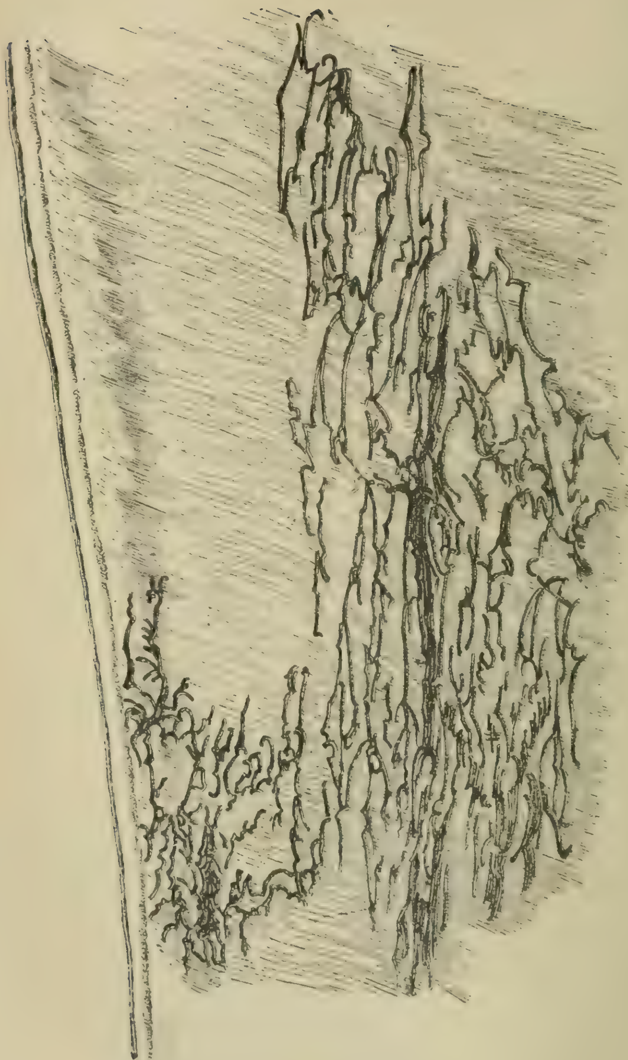

JOHNSTONS'

Dental Miscellany.

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MYCELIUM OF FUNGUS PERFORATING DENTINE.

By S. JAMES A. SALTER, M.B., F.R.S., Dental Surgeon to Guy's Hospital.

The power which living vegetable tissues have, of acting on the organic and inorganic bodies, with which they are in contact, or on which they live, is one of the most interesting, as well as one of the most mysterious subjects of scientific inquiry.

As yet very little is known beyond results; and the exact nature of what happens is for the most part merely matter of speculation.

We know that vegetables have a power of elective affinity in their nutrition—in their own self-feeding processes; that a compound body may be in contact with a vegetable growth, which will rob it of part of its composition, taking one element and rejecting another; the results being traceable in the appropriation and in the residue. We know that a growing vegetable may upset the chemical composition of an organic body in contact with it, without any such assumption of its constituent parts, occasioning, by catalysis, a redistribution of atoms, the aggregate result showing neither loss nor gain. Then again there are the forces of vegetable growth, such as, taken in the mass, where a fungus lifts a paving stone; and that in detail where the mycelium of a fungus insinuates its growing threads between the histological elements of its nidus; for instance, as the "rootlets" of mould burrow among the cellular tissue of a rotting apple and push aside the cells. But there is another and still more remarkable power possessed by certain vegetable structures—that of boring bodily into hard and dry substances—not pushing aside elementary parts of structure, but *forging* a hole, as it were,

just as a red-hot poker would pierce through a deal board, though of course alike in appearance only, and accomplished by very different means.

This power is now known to be possessed by the mycelium of a fungus, or of fungi, and it is capable of very active operation upon hard calcified animal tissues.

It is extremely probable that it is an agent in the disintegration of such substances, fitting them for the nutrient services of higher forms of vegetable life.

This power, possessed by fungus-mycelium, has been recognized for a comparatively short time only ; and the appearances presented by the perforations thus effected were originally mistaken for peculiarities and characteristics of the structures so pierced. A distinguished English microscopist first described and figured these tubular hollows as seen in the shell of a molluscous animal, and believed them to be characteristics of generic value. This opinion was held till challenged and refuted by Professor Kölliker, who discovered that similar perforations were frequently to be found in other shells, and in calcareous corals ; and these he showed to depend on the presence of the mycelium of a fungus.

When Mr. Mummery, a few years since, read his interesting memoir on the dentition of different races and of different epochs, he kindly gave me a variety of teeth, that I might find, if I could, some histological peculiarities. My results were nearly if not quite negative ; but while I sought one thing I found another. The majority of the ancient British teeth were pierced with numerous small tubular canals, perhaps ten times the diameter of the dentinal tubes, passing through the dentine and the cement in a manner quite independent of the course of the structure of those tissues. I at once perceived that this was another example of fungus-mycelium piercing a hard calcified tissue, and for the time I believed it to be, not only, as it was, an original observation, but one in advance of other microscopists, as regards tooth structures. In this, however, I was mistaken ; for, upon looking up the literature of the subject, I found that Herr Eberth made a communication to the Physico-Medical Society of Würsburg on the 10th of January, 1863, describing the discovery by him of a fungus growing in the hard substances of teeth. This was recorded in the Journal of the Society for 1864. The abstract report of the communication is as follows :

"Herr Eberth speaks of the appearance of fungi in the cement of an apparently sound human tooth, and exhibits the preparation appertaining thereto. The numerous fungi had penetrated from the uninjured sur-

face of the cement through the latter a short distance into the dentine. That they were produced during life-time he leaves undetermined. Several examinations of carious teeth afford a negative result."

But far more interesting observations were made immediately afterwards by Wedl.* He discovered precisely the same perforations in fossil teeth of Pycnodus and of Hemipristris: and he found similar appearances in the bone of a fossil rib from some mammal.

What is still more important, Wedl succeeded experimentally in producing these appearances by soaking teeth in water which contained fungus spores, probably of a species of Hygrocrocis. Upon making a section of such teeth after ten days' immersion, it was found that the fungi had pierced the cement and passed a considerable distance into the dentine, producing appearances very like those which he found in fossil teeth, and like those which I now figure; but more superficial and less extensive. The enamel was not acted upon.

Very thin sections of teeth were curiously invaded by the fungus. After thirty-one days, Wedl found that circular and crescentic hollows were eaten out of the substance of the dentine: and he found the same in sections of bone after seventeen days' immersion in the spore fluid.

The plate which precedes this paper represents a portion of a longitudinal section of the fang of a bicuspid tooth—Ancient British. It was drawn from nature by Mr. Morriit Williams, and it shows the mycelial borings very characteristically.

Such specimens are striking objects under the microscope; the large, dark, air-filled, cylindrical hollows contrast remarkably in their irregularity and size with the detinal tubes. The diameter of the hollows is very uniform, and they appear to be quite cylindrical. Though usually irregular in their course, there is often a general direction among many contiguous tubes. At other times their course is quite confused. Occasionally they are straight and parallel in a sort of fasciculus, then again they are seen in a mass radiating from a centre, and moss-like. They may be few and scattered, or so numerous as to have destroyed nearly the whole substance of the dentine, reducing its cohesion to such an extent as to render it impossible to make a section. Such specimens as these latter are best examined for displaying the mycelium itself. By treating a small piece of this much-perforated dentine with hydrochloric acid, slightly diluted, and picking it abroad with fine points, the mycelium is readily made out. It consists of a slightly refracting vegetable tube, which lines each cylindrical hollow in the den-

* Uber einen in Zahnbein und Knochen keimenden Pilz. Vienna, 1864.

tine. The tubes are usually open for the entire length visible; but sometimes they appear septate, as though elongated cells were joined end to end. Apparent nuclei are seen in some places, and here the tube is bulbed or varicose. The mycelium enters the substance of the tooth either by piercing the cement on the fang, or by boring into the dentine from the pulp cavity. In no case have I found it invading the enamel. What the exact botanical nature of this vegetable growth may be I am not prepared to say. Perhaps it is a Hygrocrocis; but upon this matter I am no authority.

There can, I think, be no doubt that the attack of the mycelium on the tooth takes place out of the body, and not during the life of the tooth. If it were otherwise it would surely have been met with often and long ere this. Wedl's experiments point to this conclusion.

Still the subject is not without interest to the dental pathologist as well as to the general physiologist.

To the latter the question arises—By what power does this slender cellular thread pierce a hard calcified tissue?

The process of course is a vital one; but vital processes are simply physical and chemical forces directed by living agency. And, as Kölliker points out, for a soft vegetable thread to make a way for its extending growth through a hard substance, mainly composed of an insoluble lime salt, involves a power in that vegetable of first rendering that lime salt soluble; and it is inconceivable how that can be accomplished without the vegetable supplying or generating a solvent acid. And this bears upon an all-important question in dental pathology—the nature and production of caries.

The fungus whose ravages on dentine I have now described has certainly nothing to do with the decay of living teeth; but we know that dentinal caries is generally (I believe *always*) associated with a mycelial growth, known as *Leptothrix buccalis*: and what may be effected by one fungus may probably be effected by another. It is not my intention to go into this subject at length. I will merely say that, in recent researches on the intimate anatomy of carious dentine, I have found that the leptothrix has considerable boring power in *soft* dentine. It has already been shown to enter the dentinal tubes; and I have found it in the intertubular tissue far from the surface. But whether it bores by acid producing points, and whether it assists by catalysis in developing the acids which decalcify the dentine, are at present questions of speculation. That it pervades the tissue and disintegrates it, however, is certain.—*British Journal of Dental Science.*

NITROUS OXIDE IN PROLONGED SURGICAL OPERATIONS.*

By D. H Goodwillie, M.D., D.D.S., Member of Medical Society of City and County of New York, of the Medical Library and Journal Association, Permanent Member of the American Medical Association, &c , &c.

In order to a better understanding of the practical bearing of this subject, it may not be amiss to offer a few remarks on the physiological effects of nitrous oxide, which are of an interesting and peculiar character.

The properties and influences of nitrous oxide are both organic and dynamic. Organic in supplying elements (nitrogen and oxygen,) dynamic in stimulating the functions of the economy.

The action of nitrous oxide appears to be of a compound kind, from the operation of both its elements (nitrogen and oxygen,) in their associate and single state.

It being an aeriform body, and homologous with the atmosphere, air, thus affording the most favorable opportunity for chemical reaction, molecular nutrition, organic and vital development. Although a strong similarity exists between nitrous oxide and the atmospheric air, yet in their relative effects they vary considerably. In the former there is a more decided stimulant action. Nitrous oxide contains about one-third of oxygen to two-thirds of nitrogen. Atmospheric air has only one-fifth of oxygen to four-fifths of nitrogen. In the former these two elements are chemically united, while in the latter they are mechanically united. Nitrous oxide is an active supporter of combustion.

As nitrogen does not support combustion or respiration, we attribute the effect of nitrous oxide to the oxygen it contains.

Oxygen very soon exhausts the powers of life. Nitrogen, being negative in its character, serves as a diluent to the oxygen in the air, so as to adapt the atmospheric air to the requirements of animal and vegetable life.

Nitrous oxide differs from air in being liberally absorbed by water; in supporting combustion better than air ; by being condensed into a liquid ; air having never been liquefied.

In the act of respiration we have the two gases, carbonic acid on the one side and oxygen on the other side of a porous septum filled with fluid.

The diffusion takes place between a gas and a gas dissolved in a

* Read before the Medical Library and Journal Association of New York, Jan. 9th, 1874.

fluid moistening a membrane, and not between two gases in a gaseous form.

In illustration of this—place a moist bladder two-thirds filled with air in carbonic acid and it swells and soon bursts ; but if a dry bladder is used no distension takes place, thus showing that the passage of gases through moist membranes is due to the solubility of the gases in the fluid with which the membrane is moistened. According to this theory we now consider the physiological action of nitrous oxide, by its presence in the pulmonary vesicles.

It will become dissolved by the moisture adhering to the air vesicles, and carried by liquid diffusion into the blood. The solubility of nitrous oxide in water is much higher than that of oxygen, consequently it would find its way into the blood much more rapidly than oxygen.

We may form an idea of the relative degree of absorption of oxygen by a moist membrane such as that of the lungs from the air and in the form of nitrous oxide, when we consider that water at 68° F. (a temperature much below that of the body) takes up one volume of oxygen supplied to it by the atmospheric air, while it takes from nitrous oxide thirty-seven volumes of oxygen.

I have repeatedly produced complete anæsthesia in thirty seconds, with from five to eight inhalations of nitrous oxide.

These considerations appear to show that the action of nitrous oxide on the human system is due to an increased supply of oxygen to the blood, causing the well-known exhilarating effects, and later, when a large quantity of the gas has been absorbed, anæsthesia is produced, as is supposed, by an excessive formation of carbonic acid in the blood.

When the gas inhaled is diluted with air to a certain quantity, the exhilarating effects do not pass off into insensibility, because the carbonic acid is eliminated as fast as it is formed ; but when given undiluted with air its anæsthetic influence becomes quickly developed. According to this theory, then, the rapid return of sensibility appears due to the fact that, in proportion as the excess of carbonic acid in the blood is withdrawn from it by respiration of pure air, the oxygen in the blood becoming in excess of the carbonic acid, thus causing an immediate renewal of the vital functions.

Another theory is that nitrous oxide undergoes little or no change in the lungs, but is inhaled and exhaled as such, and preventing the normal interchange of oxygen and carbonic acid.

From some experiments recently made, there appeared to be very little oxygen from the nitrous oxide decomposed in the blood.

"Among the physiological effects of nitrous oxide," says Dr. Geo. J. Zeigler, "it has special action on certain parts of the system, particularly the blood, brain, nervous system, and genito-urinary organs, being very efficient in preserving the health in such parts of the economy, and in promoting the other immediate functions. While it exerts a very prompt and decided stimulant action on the human system, yet it is entirely distinct from all other stimulants." One of its most characteristic and desirable features is that it is followed by little or no depression or languor.

The quantity of nitrous oxide appropriated, and the particular susceptibilities of individuals, make a variation in its effects on the organism. From a slight pleasurable exaltation of the functions of body to that of mental excitement and exhilaration, and then to end in anæsthesia.

The anæsthetic effects are so quickly and quietly produced that many are disposed to dispute (until otherwise convinced) that they have been under its influence.

In many cases the cerebral functions are more or less active during the anæsthetic stage, as very many have dreams. Some are humorous and others serious. I have observed that these dreams are most always foreign to the operation of which they are the subject. I have had long dreams told me that one would suppose took hours to produce, when they actually occurred in as many seconds, or during anæsthesia, which in these cases was very short. These dreams did not refer in the least to their physical condition, and must have occurred during anæsthesia.

A lady on whom a severe surgical operation had been performed, when she was returning to consciousness was so provoked at me that she burst into a fit of crying, and, as she afterwards told me, was because I had spoiled a good time she was enjoying by dreaming of her success as a public singer. There are others, however, that the anæsthetic stage is a mere blank in their memory. Some finish sentences, words, or actions on recovery, which had been cut short by advancing anæsthesia.

To illustrate this—a gentleman to whom I had often administered the nitrous oxide for its pleasurable effect on him, and once or twice carried it into complete anæsthesia, for he had always asserted that the gas could not deprive him of his consciousness, and on these occasions stoutly denied that it had any effect to put him to sleep, as he said. In the course of time it became necessary to administer an anæsthetic to him for the purpose of opening a large abscess. Nitrous oxide was

proposed. His reply was, "If you can put me to sleep." I assured him nothing would be done until he was in the "Land of Nod," and out of sense of pain. He consented, and passing into the stage of anæsthesia, he said "You can't" and on his returning to consciousness some minutes after, and looking straight at me, finished his sentence, "do it, Doctor." And as he was shown his bleeding wound he exclaimed, "Is it possible?"

It is scarcely necessary to say that he is now a firm believer in the anæsthetic effects of nitrous oxide.

Several years ago I made some experiments upon animals, to determine how long anæsthesia could be kept up, and was satisfied that it could be prolonged an indefinite period with pure gas and a careful administration. Since then, this has become an established fact, as the following cases will show.

Case I.—*Jan. 23, 1869.*—Inmate of Bellevue Hospital. Embolia, dry gangrene, and amputation of thigh. Caroline Carrol, aged thirty-five years, seamstress. Patient, on admission, was suffering from chronic pleurisy, with emphysema and empyma. Albumen and casts in the urine in great abundance; very much emaciated; little appetite; high hectic and profuse night sweats; heart murmurs basic and soft; leg was green from foot to knee. Considering it exceedingly hazardous to give chloroform or ether, nitrous oxide was administered. Anæsthesia produced in thirty seconds, and kept up for thirteen minutes. Rapid recovery from the anæsthetic. Patient expressed herself as feeling stronger. There did not appear any depression after the operation.

Jan. 27, four days after.—Patient doing very well. Pulse and general condition very good. This was a case in which nitrous oxide was particularly applicable, as any other anæsthetic would have depressed her vitality, already very low, and resulted probably very unfavorably.

Case II.—*Jan. 26, 1869.*—Amputation of thigh. William Burke, aged twenty-four years. In spring of 1862 was struck by a base-ball on right knee. In about six weeks after the injury, synovitis of the joint presented itself, which became chronic, and in about two years suppuration of the joint took place, and a large and constant discharge of pus caused cachexia. Appetite poor; debility great. Amputation performed. Anæsthesia by nitrous oxide produced in one minute fifteen seconds, and maintained for six minutes. Patient rapidly recovered consciousness and felt very well. Had a better pulse after the

operation than before it. The same remarks will apply in this case as in the last, and for that reason have given them more in detail.*

CASE III.—Inmate of Bellevue Hospital. Male, aged thirty-five years. Amputation of leg. Administered nitrous oxide. Anæsthesia produced in forty-five seconds and kept up ten minutes.

CASE IV.—*Dec. 23, 1871.*—Inmate of Strangers' Hospital. Female, age —. Operation for recto-vaginal fistula. Anæsthesia produced by nitrous oxide in one and a half minutes, and kept up for fifteen minutes. Recovery in thirty seconds from the anæsthetic.

CASE V.—Inmate of Strangers' Hospital. Reduction of a dislocation at the hip joint. Nitrous oxide administered, and patient came very readily under its influence, but there being considerable rigidity of the muscles, it was discontinued, and ether substituted. Have had little experience with nitrous oxide in dislocation, but I am inclined to think it does not relax the muscles sufficiently in every case.

CASES IN PRIVATE PRACTICE.

CASE VI.—*Oct. 13, 1871.*—Mrs. P. Operation prolapsus uteri. Nitrous oxide produced anæsthesia in one and a half minutes, and kept up for fifty minutes. Recovered consciousness in one minute and forty-five seconds. No sickness or unpleasant feelings. Patient expressed herself as knowing nothing of the operation, and of its having been a success.

Nov. 9, 1871.—Gave nitrou. oxide to same patient and kept up anæsthesia for thirty minutes, with above result.

CASE VII.—*Oct.* 21, 1871.—Mrs. E. Uterine trouble. Nitrous oxide administered, and anæsthesia kept up for five minutes. No sickness.

CASE VIII.—*Oct. 22, 1871.*—Boy fifteen years of age. Operation for varicose veins of the cheek. Anæsthesia quietly produced by nitrous oxide in one minute and kept up for five minutes. Three

NOTE.—At this same clinic, five surgical operations were performed, and a different anæsthetic given in every case. First, nitrous oxide, as related in the last case; Second, male, aged thirty-nine years, excision of testicle. Anæsthesia produced by tetrachloride of carbon ($C.Cl.^{4.}$) in five and a half minutes, and kept up for nine and a half minutes. Third, male, sixty-two years of age; resection of elbow joint; half ounce of bichloride of mythylene ($C.H.^{2.}\ Cl.^{2.}$) produced anæsthesia in three minutes, and kept it up for eighteen minutes. Fourth, male, aged fifty-eight years; excision of testicle; half ounce of chloroform produced anæsthesia in three minutes and kept it up for seven minutes. Fifth, male, aged forty-two years; necrosis of sternum; four ounces of ether produced anæsthesia in four minutes and kept it up for fifteen minutes. All appeared successful as far as the anæsthetics were concerned.

ounces of chloroform had on a former occasion been used, and only after a long time and great resistance was anæsthesia produced.

CASE IX.—Miss R. Partially demented; and in order to make a uterine examination that could not be done otherwise except by force, the parent rather consenting to have nitrous oxide administered, which was done very quietly and kept up for five and a half minutes with perfect success and delight, particularly to the afflicted parents. The examination was important, as it was suspected that mental derangement came from this source or was aggravated by it.

CASE X.—*Oct. 30, 1871.*—Mrs. T. Amputation of the right breast. Nitrous oxide administered, and anæsthesia kept up for thirty minutes. This patient was one of those extreme cases that is difficult to anæsthetize with any of the anæsthetics. Some difficulty in keeping her fully under the effects of the gas. One hundred gallons of nitrous oxide was inhaled, it being the largest quantity that I ever remember administering in that space of time. She had no knowledge of the operation upon recovery from the gas.

CASE XI.—*Oct. 30, 1871.*—Mrs. F. H. S. Uterine tumor. Performed electrolysis under the administration of nitrous oxide, anæsthesia being kept up for fifteen minutes. Recovery in thirty seconds. Patient thanked me for the pleasant dreams she had.

Nov. 6.—Repeated the administration as above, with the same good results.

CASE XII.—*Nov. 8, 1871.*—Mrs. L. Operation for ruptured perinæum. Administered nitrous oxide and produced anæsthesia in one minute and kept it up for thirty minutes. Recovery in one minute from the anæsthetic.

CASE XIII.—*Nov. 30, 1871.*—Miss —, aged sixty-four years. Operation for ovarian tumor. Administered nitrous oxide, produced anæsthesia in two and a quarter minutes and kept up anæsthesia for thirty-seven minutes. Recovery from it in one minute, and felt very well. This case made a remarkable recovery from this operation, when we consider the age and feeble condition of the patient.

CASE XIV.—*Dec.* 2, 1871.—Miss N. E. W. Operation for ovarian tumor. Anæsthesia produced in two and a half minutes and kept up for twenty-seven minutes.

As ovarian tumors interfere with respiration, it will account for the length of time to produce anæsthesia.

CASE XV.—*Dec.* 5, 1871.—Mrs. H. Uterine trouble, Anæsthesia produced by nitrous oxide in one and a quarter minutes and kept up for four minutes. Administered it on four other occasions to the patient for longer time, and always with the best of results.

CASE XVI.—Inmate of German Hospital. Ovarian tumor. Nitrous oxide administered, and the anæsthetic effect kept up for fifteen minutes. Patient made a very good recovery. At no time after the operation did her pulse go above eighty-five pulsations to the minute.

My experience since the above cases has been with like favorable results.

The average amount of gas used in prolonged anæsthesia is about two gallons per minute.

To keep up prolonged anæsthesia requires great care and judgment on the part of the anæsthetist. Anæsthesia on the one hand and consciousness of pain on the other are conditions of the body with respect to time, bear close relations to each other, and so judgment and prompt action in administering the gas is required. The anæsthetist in any case *must not* allow his attention to be distracted from his patient.

The principal impurity of the nitrous oxide is from the deutoxide of nitrogen ($N. O.^2$) which, being inhaled, takes up two more equivalents of oxygen from the lungs and air passages, and becomes nitrous acid ($N. O.^4$) a poisonous agent. This may be known by the caustic effect it has on the mucous lining of the air passages.

Under a pressure of 30 atmospheres at 0° or 50 atmospheres at 45° F. and about 750 pounds expansive force to the square inch, the gas condenses into a colorless transparent liquid. This is now held in strong wrought iron cylinders.

These cylinders are made and filled with the liquid gas. Before they are used they undergo an expansive pressure of 5,000 pounds to the square inch—more than six times the explosive power of nitrous oxide.

A fowling-piece when discharged is subjected to a force of about 15,000 pounds to the square inch—twenty times the power of liquid nitrous oxide—so that there is little relative danger to be apprehended from explosion.

Case No. VI, Oct. 13, 1871, is the first reported case of anæsthesia by liquid nitrous oxide (from these cylinders) in this country. I have used this case ever since.

Nitrous oxide ought always to be administered through an inhaler having valves for exhalation to pass out. The inhaler I have found most efficient covers both mouth and nose.

THE THEORY OF MOLECULES.

A LECTURE DELIVERED BEFORE THE BRITISH ASSOCIATION AT BRADFORD.

BY PROFESSOR CLERK MAXWELL, F.R.S.

From the Popular Science Monthly

Concluded from No. 2

Another way of tracing the diffusion of molecules through calm air is to heat the upper stratum of the air in a vessel, and so observe the rate at which this heat is communicated to the lower strata. This, in fact, is a third kind of diffusion—that of energy, and the rate at which it must take place was calculated from data derived from experiments on viscosity before any direct experiments on the conduction of heat had been made. Prof. Stefan, of Vienna, has recently, by a very delicate method, succeeded in determining the conductivity of air, and he finds it, as he tells us, in striking agreement with the value predicted by the theory.

All these three kinds of diffusion—the diffusion of matter, of momentum, and of energy—are carried on by the motion of the molecules. The greater the velocity of the molecules, and the farther they travel before their paths are altered by collision with other molecules, the more rapid will be the diffusion. Now, we know already the velocity of the molecules, and therefore by experiments on diffusion we can determine how far, on an average, a molecule travels without striking another. Prof. Clausius, of Bonn, who first gave us precise ideas about the motion of agitation of molecules, calls this distance the mean path of a molecule. I have calculated, from Prof. Loschmidt's diffusion experiments, the mean path of the molecules of four well-known gases. The average distance traveled by a molecule between one collision and another is given in the table. It is a very small distance, quite imperceptible to us even with our best microscopes. Roughly speaking, it is about the tenth part of the length of a wave of light, which you know is a very small quantity. Of course the time spent on so short a path by such swift molecules must be very small. I have calculated the number of collisions which each must undergo in a second. They are given in the table, and are reckoned by thousands of millions. No wonder that the traveling power of the swiftest molecule is but small, when its course is completely changed thousands of millions of times in a second.

The three kinds of diffusion also take place in liquids, but the relation between the rates at which they take place is not so simple as in

the case of gases. The dynamical theory of liquids is not so well understood as that of gases, but the principal difference between a gas and a liquid seems to be that, in a gas each molecule spends the greater part of its time in describing its free path, and is for a very small portion of its time engaged in encounters with other molecules, whereas in a liquid the molecule has hardly any free path, and is always in a state of close encounter with other molecules.

Hence, in a liquid, the diffusion of motion from one molecule to another takes place much more rapidly than the diffusion of the molecules themselves, for the same reason that it is more expeditious in a dense crowd to pass on a letter from hand to hand than to give it to a special messenger to work his way through the crowd. I have here a jar, the lower part of which contains a solution of copper sulphate, while the upper part contains pure water. It has been standing here since Friday, and you see how little progress the blue liquid has made in diffusing itself through the water above. The rate of diffusion of a solution of sugar has been carefully observed by Voit. Comparing his results with those of Loschmidt on gases, we find that about as much diffusion takes place in a second in gases as requires a day in liquids.

The rate of diffusion of momentum is also slower in liquids than in gases, but by no means in the same proportion. The same amount of motion takes about ten times as long to subside in water as in air, as you will see by what takes place when I stir these two jars, one containing water and the other air. There is still less difference between the rates at which a rise of temperature is propagated through a liquid and through a gas.

In solids the molecules are still in motion, but their motions are confined within very narrow limits. Hence, the diffusion of matter does not take place in solid bodies, though that of motion and heat takes place very freely. Nevertheless, certain liquids can diffuse through colloid solids, such as jelly and gum, and hydrogen can make its way through iron and palladium.

We have no time to do more than mention that most wonderful molecular motion which is called electrolysis. Here is an electric current passing through acidulated water, and causing oxygen to appear at one electrode, and hydrogen at the other. In the space between, the water is perfectly calm, and yet two opposite currents of oxygen and of hydrogen must be passing through it. The physical theory of this process has been studied by Clausius, who has given reasons for asserting that in ordinary water the molecules are not only moving,

but every now and then striking each other with such violence that the oxygen and hydrogen of the molecules part company, and dance about through the crowd, seeking partners which have become dissociated in the same way. In ordinary water these exchanges produce, on the whole, no observable effect, but no sooner does the electro-motive force begin to act, than it exerts its guiding influence on the unattached molecules and bends the course of each toward its proper electrode, till the moment when, meeting with an unappropriated molecule of the opposite kind, it enters again into a more or less permanent union with it till it is again dissociated by another shock. Electrolysis, therefore, is a kind of diffusion assisted by electro-motive force.

Another branch of molecular science is that which relates to the exchange of molecules between a liquid and a gas. It includes the theory of evaporation and condensation, in which the gas in question is the vapor of the liquid, and also the theory of the absorption of a gas by a liquid of a different substance. The researches of Dr. Andrews on the relations between the liquid and the gaseous state have shown us that, though the statements in our own elementary text-books may be so neatly expressed that they appear almost self-evident, their true interpretation may involve some principle so profound that, till the right man has laid hold of it, no one ever suspects that anything is left to be discovered.

These, then, are some of the fields from which the data of molecular science are gathered. We may divide the ultimate results into three ranks, according to the completeness of our knowledge of them.

To the first rank belong the relative masses of the molecules of different gases, and their velocities in metres per second. These data are obtained from experiments on the pressure and density of gases, and are known to a high degree of precision.

In the second rank we must place the relative size of the molecules of different gases, the length of their mean paths, and the number of collisions in a second. These quantities are deduced from experiments on the three kinds of diffusion. Their received values must be regarded as rough approximations till the methods of experimenting are greatly improved.

There is another set of quantities which we must place in the third rank, because our knowledge of them is neither precise, as in the first rank, nor approximate, as in the second, but is only as yet of the nature of a probable conjecture. These are the absolute mass of a molecule, its absolute diameter, and the number of molecules in a cubic centi-

metre. We know the relative masses of different molecules with great accuracy, and we know their relative diameters approximately. From these we can deduce the relative densities of the molecules themselves. So far we are on firm ground.

The great resistance of liquids to compression makes it probable that their molecules must be at about the same distance from each other as that at which two molecules of the same substance in the gaseous form act on each other during an encounter. This conjecture has been put to the test by Lorenz Meyer, who has compared the densities of different liquids with the calculated relative densities of the molecules of their vapors, and has found a remarkable correspondence between them.

Now, Loschmidt has deduced from the dynamical theory the following remarkable proportion : As the volume of a gas is to the combined volume of all the molecules contained in it, so is the mean path of a molecule to one-eighth of the diameter of a molecule.

Assuming that the volume of the substance, when reduced to the liquid form, is not much greater than the combined volume of the molecules, we obtain from this proportion the diameter of a molecule. In this way Loschmidt, in 1865, made the first estimate of the diameter of a molecule. Independently of him and of each other, Mr. Stoney, in 1868, and Sir W. Thomson, in 1870, published results of a similar kind, those of Thomson being deduced not only in this way, but from considerations derived from the thickness of soap-bubbles, and from the electric properties of metals.

According to the table, which I have calculated from Loschmidt's data, the size of the molecules of hydrogen is such that about two million of them in a row would occupy a millimetre, and a million million million million of them would weigh between four and five grammes !

In a cubic centimetre of any gas at standard pressure and temperature there are about nineteen million million million molecules. All these numbers of the third rank are, I need not tell you, to be regarded as at present conjectural. In order to warrant us in putting any confidence in numbers obtained in this way, we should have to compare together a greater number of independent data than we have as yet obtained, and to show that they lead to consistent results.

Thus far, we have been considering molecular science as an inquiry into natural phenomena. But, though the professed aim of all scientific work is to unravel the secrets of Nature, it has another effect, not less valuable, on the mind of the worker. It leaves him in possession

of methods which nothing but scientific work could have led him to invent, and it places him in a position from which many regions of Nature, besides that which he has been studying, appear under a new aspect. The study of molecules has developed a method of its own, and it has also opened up new views of Nature.

When Lucretius wishes us to form a mental representation of the motion of atoms, he tells us to look at a sunbeam shining through a darkened room (the same instrument of research by which Dr. Tyndall makes visible to us the dust we breathe), and to observe the motes which chase each other in all directions through it. This motion of the visible motes, he tells us, is but a result of the far more complicated motion of the invisible atoms which knock the motes about. In his dream of Nature, as Tennyson tells us, he

> "saw the flaring atom-streams
> And torrents of her myriad universe,
> Running along the illimitable inane,
> Fly on to clash together again, and make
> Another and another frame of things
> Forever."

And it is no wonder that he should have attempted to burst the bonds of Fate by making his atoms deviate from their courses at quite uncertain times and places, thus attributing to them a kind of irrational free-will, which, on his materialistic theory, is the only explanation of that power of voluntary action of which we ourselves are conscious.

As long as we have to deal with only two molecules, and have all the data given us, we can calculate the result of their encounter; but when we have to deal with millions of molecules, each of which has millions of encounters in a second, the complexity of the problem seems to shut out all hope of a legitimate solution.

The modern atomists have therefore adopted a method which is, I believe, new in the department of mathematical physics, though it has long been in use in the section of statistics. When the working members of Section F get hold of a report of the census, or any other document containing the numerical data of Economic and Social Science, they begin by distributing the whole population into groups, according to age, income-tax, education, religious belief, or criminal convictions. The number of individuals is far too great to allow of their tracing the history of each separately, so that, in order to reduce their labor within human limits, they concentrate their attention on a small number of artificial groups. The varying number of individuals in each group, and not the varying state of each individual, is the primary datum from which they work.

This, of course, is not the only method of studying human nature. We may observe the conduct of individual men and compare it with that conduct which their previous character, and their present circumstances, according to the best existing theory, would lead us to expect. Those who practice this method endeavor to improve their knowledge of the elements of human nature in much the same way as an astronomer corrects the elements of a planet by comparing its actual position with that deduced from the received elements. The study of human nature by parents and school-masters, by historians and statesmen, is therefore to be distinguished from that carried on by registrars and tabulators, and by those statesmen who put their faith in figures. The one may be called the historical, and the other the statistical method.

The equations of dynamics completely express the laws of the historical method as applied to matter, but the application of these equations implies a perfect knowledge of all the data. But the smallest portion of matter which we can subject to experiment consists of millions of molecules, not one of which ever becomes individually sensible to us. We cannot, therefore, ascertain the actual motion of any one of these molecules, so that we are obliged to abandon the strict historical method, and to adopt the statistical method of dealing with large groups of molecules.

The data of the statistical method, as applied to molecular science, are the sums of large numbers of molecular quantities. In studying the relations between quantities of this kind, we meet with a new kind of regularity—the regularity of averages—which we can depend upon quite sufficiently for all practical purposes, but which can make no claim to that character of absolute precision which belongs to the laws of abstract dynamics.

Thus molecular science teaches us that our experiments can never give us anything more than statistical information, and that no law deduced from them can pretend to absolute precision. But when we pass from the contemplation of our experiments to that of the molecules themselves, we leave the world of chance and change, and enter a region where everything is certain and immutable.

The molecules are conformed to a constant type with a precision which is not to be found in the sensible properties of the bodies which they constitute. In the first place, the mass of each individual molecule, and all its other properties, are absolutely unalterable. In the second place, the properties of all molecules of the same kind are absolutely identical.

Let us consider the properties of two kinds of molecules, those of oxygen and those of hydrogen.

We can procure specimens of oxygen from very different sources—from the air, from water, from rocks of every geological epoch. The history of these specimens has been very different, and if, during thousands of years, difference of circumstances could produce difference of properties, these specimens of oxygen would show it.

In like manner we may procure hydrogen from water, from coal, or, as Graham did, from meteoric iron. Take two litres of any specimen of hydrogen, it will combine with exactly one litre of any specimen of oxygen, and will form exactly two litres of the vapor of water.

Now if, during the whole previous history of either specimen, whether imprisoned in the rocks, flowing in the sea, or careering through unknown regions with the meteorites, any modification of the molecules had taken place, these relations would no longer be preserved.

But we have another and an entirely different method of comparing the properties of molecules. The molecule, though indestructible, is not a hard, rigid body, but is capable of internal movements, and when these are excited it emits rays, the wave-length of which is a measure of the time of vibration of the molecule.

By means of the spectroscope, the wave-lengths of different kinds of light may be computed to within one ten-thousandth part. In this way it has been ascertained, not only that molecules taken from every specimen of hydrogen in our laboratories have the same set of periods of vibration, but that light, having the same set of periods of vibration, is emitted from the sun and from the fixed stars.

We are thus assured that molecules of the same nature as those of our hydrogen exist in those distant regions, or at least did exist when the light by which we see them was emitted.

From a comparison of the dimensions of the buildings of the Egyptians with those of the Greeks, it appears that they have a common measure. Hence, even if no ancient author had recorded the fact that the two nations employed the same cubit as a standard of length, we might prove it from the buildings themselves. We should also be justified in asserting that at some time or other a material standard of length must have been carried from one country to the other, or that both countries had obtained their standards from a common source.

But in the heavens we discover by their light, and by their light alone, stars so distant from each other, that no material thing can ever

have passed from one to another; and yet this light, which is to us the sole evidence of the existence of these distant worlds, tells us also that each of them is built up of molecules of the same kinds as those which we find on earth. A molecule of hydrogen, for example, whether in Sirius or in Arcturus, executes its vibrations in precisely the same time.

Each molecule, therefore, throughout the universe, bears impressed on it the stamp of a metric system as distinctly as does the metre of the Archives of Paris, or the double royal cubit of the Temple of Karnac.

No theory of evolution can be formed to account for the similarity of molecules; for evolution necessarily implies continuous change, and the molecule is incapable of growth or decay, of generation or destruction.

None of the processes of Nature, since the time when Nature began, have produced the slightest difference in the properties of any molecule. We are, therefore, unable to ascribe either the existence of the molecules, or the identity of their properties, to the operation of any of the causes which we call natural.

On the other hand, the exact equality of each molecule to all others of the same kind gives it, as Sir John Herschel has well said, the essential character of a manufactured article, and precludes the idea of its being eternal and self-existent.

Thus we have been led, along a strictly scientific path, very near to the point at which Science must stop. Not that Science is debarred from studying the internal mechanism of a molecule which she cannot take to pieces, any more than from investigating an organism which she cannot put together. But, in tracing back the history of matter, Science is arrested when she assures herself, on the one hand, that the molecule has been made, and on the other that it has not been made by any of the processes we call natural.

Science is incompetent to reason upon the creation of matter itself out of nothing. We have reached the utmost limit of our thinking faculties when we have admitted that because matter cannot be eternal and self-existent it must have been created.

It is only when we contemplate, not matter in itself, but the form in which it actually exists, that our mind finds something on which it can lay hold.

That matter, as such, should have certain fundamental properties—that it should exist in space and be capable of motion, that its motion should be persistent, and so on, are truths which may, for anything we

know, be of the kind which metaphysicians call necessary. We may use our knowledge of such truths for purposes of deduction, but we have no data for speculating as to their origin.

But that there should be exactly so much matter, and no more, in every molecule of hydrogen, is a fact of a very different order. We have here a particular distribution of matter—a *collocation*—to use the expression of Dr. Chalmers, of things which we have no difficulty in imagining to have been arranged otherwise.

The form and dimensions of the orbits of the planets, for instance, are not determined by any law of Nature, but depend upon a particular collocation of matter. The same is the case with respect to the size of the earth, from which the standard of what is called the metrical system has been derived. But these astronomical and terrestrial magnitudes are far inferior in scientific importance to that most fundamental of all standards which forms the base of the molecular system. Natural causes, as we know, are at work, which tend to modify, if they do not at length destroy, all the arrangements and dimensions of the earth and the whole solar system. But though in the course of ages catastrophes have occurred, and may yet occur, in the heavens, though ancient systems may be dissolved and new systems evolved out of their ruins, the molecules out of which these systems are built—the foundation-stones of the material universe—remain unbroken and unworn.

They continue this day as they were created, perfect in number, and measure, and weight, and, from the ineffaceable characters impressed on them, we may learn that those aspirations after accuracy in measurement, truth in statement, and justice in action, which we reckon among our noblest attributes as men, are ours, because they are essential constituents of the image of Him who in the beginning created, not only the heaven and the earth, but the materials of which heaven and earth consist.

TABLE OF MOLECULAR DATA.

		Hydrogen.	Oxygen.	Carbonic Oxide.	Carbonic Acid.
Rank I.	Mass of molecule (hydrogen=1)	1	16	14	22
	Velocity (of mean square), metres per second at 0° C.	1,859	465	497	396
Rank II.	Mean path, tenth-metres.	965	560	482	379
	Collisions in a second (millions).	17,750	7,646	9,489	9,720
Rank III.	Diameter, tenth-metre.	5.8	7.6	8.3	9.3
	Mass, twenty-fifth grammes.	46	736	644	1,012

TABLE OF DIFFUSION: $\frac{(\text{centimetre})^2}{\text{second}}$ – measure.

	Calculated.	Observed.	
H & O	0.7086	0.7214	Diffusion of matter observed by Losch
H & CO	0.6519	0.6422	
H & CO^2	0.5575	0.5558	
O & CO	0.1807	0.1802	
O & CO^2	0.1427	0.1409	
CO & CO^2	0.1386	0.1406	
H	1.2990	1.49	Diffusion of momentum. Graham and Meyer.
O	0.1884	0.213	
CO	0.1748	0.212	
CO^2	0.1087	0.117	
Air	......	0.256	Diffusion of temperature observed by Stefan.
Copper	......	1.077	
Iron	......	0.183	
Cane-sugar in water 0.00000365			Voit.
Diffusion in a day ..0.3114			
Salt in water.......0.00000116			Fick.

SOME METHODS OF FANG-FILLING.

An Essay read before the New York Odontological Society, January 20, 1874.

By Edward Maynard, K. R. E.

Mr. President and Gentlemen: In complying with your request that I should be your essayist for this evening, I would first say that I do not wish to be regarded as one who thinks he alone has the right ways of operating in the cases coming under the title of this essay. I am addressing men cultured in many branches of science and art, many of you of long experience, and of extensive observation of the methods of other operators. I shall not assume the position of teacher to such men. My purpose is rather to submit some points and methods which I have found valuable in a practice extending through many years, because I am assured by many eminent operators that some of these methods and points are not generally known—were not known even to themselves—and because many such gentlemen have urged me to make these things known to the younger or less experienced in this specialty.

Such things about the treatment of teeth with exposed nerves, and teeth with nerves already dead, as were given as mine by the lamented Westcott more than a quarter of a century ago, I may suppose are already known to all men familiar with the literature of our profession.

I have chosen for the few words I have to say this evening, the sub-

ject of reaching the canals of the fangs of teeth in certain cases; and I shall first take up the case of an inferior molar, whose only cavity of decay

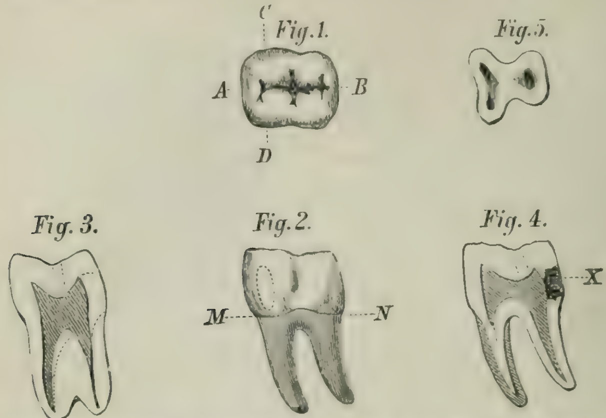

Fig. 1.—Inferior left first molar: Grinding surface. Fig. 2.—Buccal side. Fig. 3.—Section through C D of Fig. 1. Fig. 4.—Section through A B of Fig. 1. X, decay. Fig. 5.—Section through M N of Fig. 2. Dotted lines show proposed cuts. Nerve dead.

is on the posterior side, and whose nerve is dead. Often in such cases there is little or no difficulty in reaching the canal of the posterior fang through the cavity of decay; but in cases where the cavity of decay does not reach near the grinding surface, I have thought it better to cut through the grinding surface as near as might be in the direction of the canal of the posterior fang, rather than sacrifice the strength and substance of the tooth by enlarging the cavity so far as to carry its upper margin into the grinding surface. But this opening in the grinding surface, even when made very large, does not give ready access to the double canal so often found in the anterior fang. To reach this double canal, or these two canals in one fang, I make an opening to the pulp-cavity from the buccal side of the crown near the gum, and directly in the plane in which the two branches of the canal lie. This opening I make elliptical in its cross-section, its longest diameter being vertical, and perhaps one-eighth of an inch, the shorter diameter being about one-sixteenth. Through this opening I have found ready access to both branches of the anterior canal and to a great part of the pulp cavity.

Before leaving this point, I may mention that, at the meeting of the 16th of December last, on illustrating this method by sketches I had the satisfaction to learn from Dr. Goodwillie that he had successfully pursued the same method of reaching the anterior canals in such cases.

The superior molars, when decayed in like manner, present a similar difficulty as to the anterior buccal fang. In these cases I have found advantage in making an opening through the grinding surface

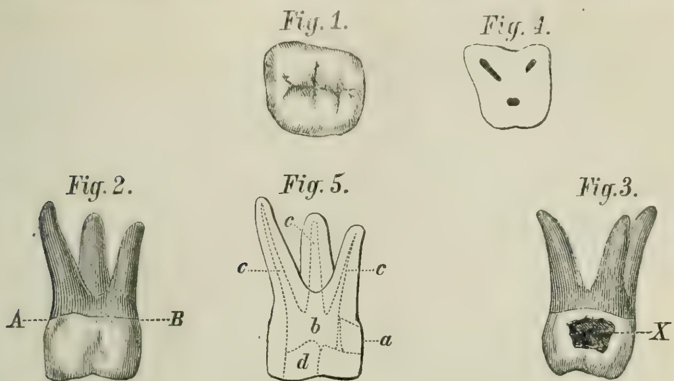

Fig. 1.—Superior left first molar: Grinding surface. Fig. 2.—Buccal side. Fig. 3.—Posterior side. X, decay. Fig. 4.—Section through A B of Fig. 2. Fig. 5.—*a*, decay; *b*, pulp cavity; *c c c*, canals; *d*, proposed cut. Nerve dead.

as nearly as might be in the line of the canal of this fang. By enlarging the opening in the direction of the other two fangs, their canals also may generally be reached without the necessity of a second or third opening.

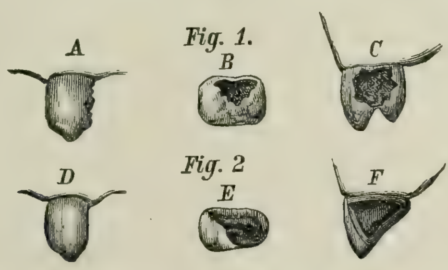

Fig. 1.—A B C, superior left bicuspis, decayed. Nerve dead. Fig. 2.—D E F, same tooth prepared for plugging.

In the case of a superior bicuspid, decayed in like manner, there is another question arising, which has led me to a practice now confirmed by more than thirty years' experience of its benefits. This question is one of form—of the best form in which to leave the bicuspis in order to preserve its beauty, and enable it to withstand or escape the force which so often destroys these teeth when much weakened by loss of dentine. The V-shaped depression between the two cusps of a superior

bicuspis, renders the tooth very liable, when thus weakened, to be split open by biting upon a bit of bone, shell, or a shot, or even upon a hard bit of bread-crust. Although, from the motion of the opposing teeth, the lingual cusp is more likely to be split off, yet it often happens that the buccal one is lost by the fracture.

To prevent the possibility of such an accident, it has long been my practice in such cases—cases of extensive decay on the rear surface, and sometimes when on the front, destroying a large part of the crown, and where the nerve cavity has to be filled—to cut away entirely the lingual cusp. There also follows from this cutting a much more ready access to the one or two canals of the fang, thus greatly facilitating the entire treatment.

Fig. 1.

Fig. 2.

Fig. 1.—Inferior right buccal side, before operation. Fig. 2.—Same, twenty years after operation.

I have been requested to give an account of a fang-filling case, which, from its novelty, may interest you, while its success entitles it to respect, and the possibility that the operation might often be performed with great advantage should claim for it your serious consideration.

Twenty years ago last June, a lady patient presented herself at my office, then in Washington. She had lost the second bicuspis of the right side, inferior arch, at an early age, and the first molar had come forward so as to close the space of the lost tooth. This first molar had lost its vitality, was very extensively decayed on the posterior side, the caries extending down the fang considerably and covered by badly diseased gum, seriously endangering the second molar, which already had a very large filling in the anterior side. The patient was in high society, and was sensitive about showing the gold in her teeth. Her mouth was a very pleasing feature, and she declined having the first molar removed if it could possibly be saved, because, when removed, the large filling in the front of the second molar would then be very conspicuous.

The operation performed was this: The crown of the tooth was divided transversely to the arch, from top to bifurcation of the fangs, into nearly equal parts, one over each fang. The posterior portion, with what remained of the posterior fang, was extracted. The anterior portion was modeled into the appearance of a second bicuspis, and its fang canals and its portion of the pulp-cavity were filled from the rear side. I saw the patient and her teeth in October last, up to which time—for more than twenty years—the half-tooth had done duty comfortably and fully as a whole bicuspis, and had served to hide the large filling in the front of the still well preserved second molar.

I have thus far said nothing of the means used to prepare these canals for filling. I suppose nearly all inventive men in our profession will, as I think they should, devise each his own instruments, and make them, to meet the needs of these cases as they occur. The skilled operator need not be told that unless the excavator used in a fang canal of small calibre works so as to bring out of the canal the particles it cuts off, it will be likely to force some of those particles so compactly into the part of the canal in advance, that progress will be retarded, and that, if particles are forced through, serious discomfort may follow.

It should seem, then, that instruments that act by a drawing cut should be used; and as cases in which curved fang excavators are to be used will often require various curves, and since it will often become desirable to change the curves of the same instruments many times in using them in a single operation, it should seem to follow that their temper ought to allow of their being bent into any needed curve.

The Swiss broaches and imitations of them so much used as fang-excavators, though having a limited use in my hands, have a value in certain cases that I do not think is generally known. Cases occur where we can follow a curved canal for some distance with a broach, but the curve is of too short a radius to allow the broach to rotate fully without breaking off. In many such cases a quarter, and sometimes a half revolution can be given to the instrument safely. Now, as the broach is five-angled, it requires but one-fifth of a revolution to make it effective. But for the greater part of the fine fang excavating I prefer instruments made of soft steel wire, shaped as occasion requires as to diameter, length and cross-section, the surface hardened by burnishing, and the cutting edges made with a knife. Such instruments work easily, and are not likely to break off in use, can be made readily and cheaply, and bent and otherwise altered and re-cut as may be necessary. At the cutting part, which is very short, they are something like a mouse-tail

file with the edges of the teeth toward the handle, but often the teeth occupy but a part of the circumference. The end should be pointed, to prevent the instrument pushing forward any portions it cuts off. To reach and fill the fang canals with gold, I have used instruments made of the same soft steel, hardened on the surface in the same manner, which leaves a high polish—very desirable to prevent that friction which is apt to draw the gold back when the instrument is drawn back.

After making the end of the instrument, however small, a plane at right-angles to the axis of the instrument, I take off the angle around the plane very slightly, barely enough to prevent it from being a cutting edge. This will not only prevent the instrument from cutting off the strip of gold, narrower than the instrument, but will prevent the end of the instrument from catching against some side of a curved canal. I have found that gold foil, about No. 20, cut into strips about two inches long, and of widths less than the diameters of the canals where they were to be packed, can be used with facility, one end of the strip being carried by the end of the instrument as far as it has been possible to follow the canal ; successive portions of the strip being carried in and packed by the instrument, an additional portion being carried forward by partially withdrawing the instrument, to enable its flat end to press upon and carry forward the free portion of the strip ; wider strips and larger instruments being used, as the diameter of the canal may permit. I need not add, perhaps, that as, in order to perform this operation in most cases, the almost constant use of the mirror is absolutely necessary, not much success can reasonably be expected from those who are deficient in the skillful use of this indispensable helper.

Though not necessarily included in the title to this paper, I think it may be useful to those who have not had much experience in this specialty of dental operations, to know how sometimes we may manage to fill safely a fang that has a large foramen. Fortunately for us, such cases are more frequently met with in the superior front teeth, which are easy of access.

Supposing such a case, and the nerve to be gone—with a fine instrument having its end bent into a very small hook we can readily find the upper end of the fang. By making a mark on the instrument opposite the lower end of the tooth, while the hook catches on the upper end of the fang, we determine the length of the entire tooth, fang included. In using excavators we have then the length given within which their action is to be confined. When all unsound parts have been removed, and the canal has been made slightly larger just within

than at the foramen, the exact diameter or diameters of the foramen may be ascertained by a fine instrument, bent at right angles at the end. By repeated trials and gradually shortening the part bent over, the largest diameter may be ascertained. Noting the length of this diameter, and the plane in which it lies, the bent end of the instrument may now be further shortened, until the shorter diameter is ascertained, and its plane. We have now the distance from the lower end of the tooth to the upper end of the fang—the lengths of the diameters of the foramen and the planes in which they lie, and these measurements constitute data upon which to model a plug of gold, which can be firmly packed within the fang, and filling its foramen fully without risk of carrying any rough or irritating portions through.

There is one point about all instruments to be used in fang canals, that seems to me not sufficiently understood. Very much of our knowledge of the condition, consistence and form of the interior surface of fangs is necessarily obtained by feeling. Now, as it is to a great degree through vibrations of the instrument that we get this knowledge, it should seem to follow that, while the instrument should itself be made very light, it should be firmly attached to a handle of very light material, in order that the vibrations may be conveyed to the fingers with as little impediment as possible. To the highly educated hand these vibrations are a language of themselves, and of inestimable value to the operator, while they enable him very greatly to lessen the suffering of the patient.

Guided by this consideration, I have used for fang instruments small wooden handles about four inches long, tipped with long metallic ferules, into which I could force the tapering tangs of the instruments.

REQUIREMENTS OF DENTAL GRADUATES.

By Bernard Hess, D.D.S., New York.

The question has arisen in the minds of many dentists as to the merits of the different Dental Colleges, in reference to their curriculum as well as to their requirements for graduation, and in view of these facts I wish to say a few words as regards my own Alma Mater.

Dental Colleges generally require of a candidate for graduation, a thesis upon a subject connected with Dentistry, which may be prepared wherever the student chooses, with the help of books, aid of copies, or

assistance of paid or unpaid friends. It is handed in, is never rejected, and remains probably unread—a few minutes of oral examination by each Professor, and the candidate is "passed." The New York College of Dentistry makes a favorable exception to this rule. Each aspirant for the degree of D.D.S. must submit to a *written* examination by *each* Professor, *and in the presence of the same, without any assistance*, except that rendered by the student's "knowledge-box." Each question is put upon the blackboard, and about half an hour's time allowed for the answer, (occupying from half a page to two pages of foolscap); as soon as finished it is handed in, *immediately read, and marked according to its merits.* The examinations take place during the last week of the session, after lecture hours; and considering that each chair propounds on an average seven questions, we have from five Professors about thirty-five questions, requiring seventeen and a half hours for the written examinations. (The oral examinations occupy about the same amount of time, but consist of a larger number of questions).

The Graduating Class of the Session 1872-73, *instead of a thesis*, answered in *writing* the following questions:

Operative Dentistry and Oral Surgery.

1. Give the eruption (in regular order,) the treatment and time for shedding the temporary teeth.

2. What is dental caries? Give the process by which it is produced, and the nature and origin of the agents by which it is effected.

3. Describe the antrum of Highmore; give its function, the diseases to which it is subject, and their treatment.

4. Give the varieties of alveolar abscess, their causes and treatment.

5. What are the conditions of system which preclude severe dental operations? Give the treatment of such patients.

6. Give the successive steps in properly filling an approximate cavity in a front tooth.

7. What is the best styptic known?

Mechanical Dentistry.

1. Describe the treatment of the mouth, preparatory to the insertion of artificial dentures.

2. What are the materials and methods employed in obtaining impressions of the mouth?

3. Describe the humid or wet process of refining gold.

4. Describe all the methods employed for retaining artificial teeth in the mouth.

5. What principles are to be observed in the insertion of artificial teeth?

Histology, Visceral Anatomy and Physiology.

1. Describe briefly the theories of Schwann, Virchow and Beal, upon cell development.

2. Into what classes are the normal tissues divided? Give examples in each class.

3. Name the various functions of nutrition, of the nervous system, and of reproduction, and their objects respectively.

4. What are proximate principles? Into what three classes are they divided? Give examples in each class.

5. Describe the phenomena which occur during the intimate process of nutrition.

6. Classify the cranial nerves, according to their functions; give the point of exit of each nerve from the cranium.

7. Describe the pneumogastric nerve, viz: its origin, filaments which it receives from other nerves, distribution and function.

8. Describe the composition, physical properties, quantity, temperature and function of the blood.

9. Describe in general terms the function of the spinal cord, medulla oblongata, pons varolii, cerebrum and cerebellum respectively; also the function of the vaso-visceral (or sympathetic) system.

10. How are secretions classified? Name them: how distinguished from each other, and in what manner produced?

Chemistry, Materia Medica and Therapeutics.

1. Explain the force of chemical attraction and give examples of its action.

2. Heat—its sources—effects on solids, liquids and gases—conduction, radiation, convection, and reflection of heat.

3. Hydrogen gas—its preparation and properties: description and use of the oxy-hydrogen blowpipe.

4. Furnaces—their varieties, construction and uses.

5. Manufacture, properties and uses of nitrous oxide.

6. What are the three classes of neurotic medicines? Give the action of each, and an example.

Regional Anatomy and General Pathology.

1. Origin, course, relation and distribution of the fifth or trifacial nerve.

2. Give the steps in the development, progress and repair of tissue of an abscess.

3. Give the parts present in the buccal parieties :—floor, roof, cheeks, lips and posterior boundaries.

4. Give the steps in the development, progress and cicatrization of an ulceration of mucous membrane.

5. Give the regions of the trunk—contained viscera, large arteries, veins, ducts and nerve plexuses in each.

The foregoing communication was prompted by a desire to show to the profession at large, how varied and thorough the instruction as well as the examinations are conducted at the New York College of Dentistry. Its faculty is deserving the praise of every dentist who takes pride in the elevation of the standard of our profession ; and those who may *not* entertain that spirit, I advise to remember the motto of the Knights of the Garter : "*Honi soit, qui mal y pense!*"

SWALLOWING A SET OF TEETH.

Marvin C. Palmer, of Gansevoort, Saratoga County, who accidentally swallowed his front teeth seven weeks ago last Sunday, served last week on the Grand Jury at the county seat. He returned home Saturday evening, after stopping over one train in Saratoga. The four false teeth fastened to a silver plate, which he accidentally swallowed while eating dinner, have lodged in the lower portion of the diaphragm. He has consulted with several prominent physicians and surgeons in regard to their removal, but has received but little encouragement, he being informed that the odds would be ten to one against his surviving such a delicate operation as would be necessary. Notwithstanding this, at a meeting of physicians and surgeons to be held at Albany within a few days, his case will be presented, with the hope that they may devise some measures for his relief. Though relieved of the intense agony he suffered at first, Mr. Palmer is not yet for a moment free from pain, and is constantly reminded of the exact location of the teeth. Other than in a liquid state, he cannot swallow any food. Aside from this trouble, he is enjoying good health.—*N. Y. Commercial Advertiser, Feb. 17, 1874.*

A TWO DOLLAR RECIPE, FREE.

The Circular below was forwarded to a dentist of the East, and he replied, sending the two dollars as requested. In return, he received the recipe which we reprint. He sends both circular and recipe to us for publication, pronouncing the whole thing a swindle. We will not say as much, as the Doctor (?) *may* regard the recipe valuable, and as *there may be* a family of Morrisons, dentists, of whom we know nothing. We leave our readers to judge for themselves, adding that Dr. J. B. Morrison, the inventor of the Engine, Chair, and Bracket, has no brother in Delavan, Wisconsin.

Inventor of Apparatus
FOR
Extracting Teeth
Without Pain,
AND PLATE FOR
ARTIFICIAL TEETH,
Patented April 13, 1869,
and December 12,
1871.

OFFICE OF

DR. GEORGE MORRISON,

DENTIST.

Delavan, Wis., Jan. 1st, 1874.

DEAR SIR AND BROTHER DENTIST :—Please do not look upon this circular with prejudice, but candidly consider its merits; and here let me say on my honor as a man and a dentist, every statement herein made shall be the truth. After an experience of seventeen years in the practice of dentistry, and traveling through seven States in this Union, making one or more plates for nearly every dentist in those States, and adopting every point of merit which each dentist might suggest, I have completed a method for constructing plates for artificial teeth. I take this means to place its advantages at your service. I am aware that the day has gone by when the intelligent dentist will concede that I can make a better fitting plate than any other, neither do I claim any such superiority, but I will give you what I claim as merit. Mark well the advantages : my plate is uniform in thickness, giving the ruga of the mouth so that the wearer can articulate (or speak) distinctly. It is finished on both sides when it comes from the vulcanizer or the celluloid press, except to polish on a brush-wheel, no rasping or sandpapering required, which is usually the most disagreeable part of the work. This is not done with metal casts. I use plaster, but have a

method of hardening the model so that it is insoluble. An additional expense of five cents will prepare fifty models, and the uniformity of thickness I get as uniform as a sheet of paper, and of any thickness that may be desired. I do not use any wax or gutta percha. An investment of ten cents will furnish base plates for one hundred sets, which is a great saving to the dentist. I also save the time spent in waxing up and scraping of plates, which is one half of the work.

Should you wish to avail yourself of this method, send me Two Dollars, P. O. order, or registered letter, and I will (by return mail) send you all the necessary instructions and office-right. I trust you will appreciate my services, as this method has cost me time and money, and return your order promptly in the enclosed envelope.

Respectfully Your Servant, GEORGE MORRISON.

REFERENCES:

We, the undersigned citizens of Delavan, endorse Dr. George Morrison, as a gentleman of honor and a dentist of rare ability.

E. LATIMER, Pres. National Bank, Delavan,
D. B. BARNES, Cashier " "
REV. D. E. HALTEMAN, Pastor Baptist Church,
A. D. THOMAS, District Attorney, Walworth County,
NEWTON McGRAW, Pres. Corporation, Delavan,
REV. J. COLLIE, Pastor Congregational Church.

TO THE DENTAL PROFESSION: After a practice of twenty years in Dentistry, I candidly believe Dr. Morrison has the best method of constructing artificial dentures in existence. The time saved in finishing up alone is worth twenty-five dollars a year to any dentist, allowing nothing for the extra beauty and comfort of the plate to the wearer, and his base plate is a device few would have thought of, and is just the thing for the purpose, and at a cost of a few cents compared with gutta percha or wax. In fact, I endorse all Dr. Morrison claims for his method. J. B. KLINE, D.D.S.

WHO IS DR. GEO. MORRISON?

He is the oldest of the brothers of the Morrison family of dentists, and has attained some notoriety as an inventor in his profession. He is truly a genius, and is doing the finest business ever done in Delavan by any dentist, which is a sufficient guaranty of his ability. True merit will receive a just reward.—*Delavan Republican.*

COPY OF RECIPE RECEIVED IN RETURN FOR TWO DOLLARS.

Office of Geo. Morrison, Dentist, Delavan, Wis., 1874.

Dr................................

DEAR SIR :—This is to certify I am in receipt of two dollars, which entitles you to my method of constructing plates for artificial teeth, which I enclose, trusting you will deem it a desirable acquisition to your laboratory. This shall be your recipe, as per circular.

I am your servant, GEO. MORRISON.

DIRECTIONS.—Take the impression with plaster as usual, scrape the centre where the hard ridge is in the arch, so that the plate will not rock. Make model or cast (put no salt in plaster for cast), scrape a little each side of the arch at the heel or back part of model, so the plate will set close to the soft parts of the mouth. To harden model, place it over vulcanizing lamp and heat gently till evenly warmed through, so that the plaster will absorb the coating or varnish which is put on with brush. While model is hot, rub the face of the cast with pulverized soap-stone, to give it a polish. To prepare varnish for cast, common resin one-quarter ounce, alcohol one ounce. To make base plate, use Japanese tea lead (not from chests containing green tea, as it has not the required strength). Use three thicknesses, more or less as you may desire, burnish on to model with plate burnisher. Fasten teeth in position with wax, same as with other base. Make plate of rubber or celluloid, as usual. By close adherence to these instructions you will be successful.

PRIZE ESSAYS.

We are much disappointed at the limited number of articles submitted for competition on the subject of "Rubber Dam and its Uses"—the prize offered being "a Morrison or Suspension Engine." The subject is one of great practical interest to the profession, and from the various inquiries we have from time to time received, concerning the best method of using the rubber dam, we feel sure that those having large and successful experience in its use, cannot fail to do the profession an important service by preparing for publication the results of their practice. The paucity of contestants, together with the fact that the improved engines, offered as prizes, are not yet ready for delivery,

has induced the publishers, with the advice of friends and the approval of the committee, to extend the time for competition to the 20th day of this month, and we earnestly urge that those having skill in the use of rubber dam, send in essays immediately. The terms of competition are given on pages 37 and 38 of our January number, and will remain unvaried (except in the length of time allowed for preparation.) We also extend the time for competition for a Morrison Chair to April 10th instead of to March 10th as first proposed, and for the same reason—we have received very few essays. It is of course every way desirable that the articles be carefully prepared records of the result of experience in the matters considered, and sufficiently distinct in detail to be of service to a novice commencing use of the rubber or the engine, showing him what difficulties to expect, and how they may be successfully overcome, as well as showing him the benefits which accrue to one who finally masters their use. There will be no further delay made, and on receiving the report of the committees the prizes will be forwarded promptly.

It is necessary to call attention to the title of the essay for which we offer a Morrison Chair. It *is not* "The Morrison Engine and its Uses," as one or two writers have entitled their articles.—it *is* "Burring Engines and their Uses."

We will add that none of the envelopes containing the real name of the writers of any of the essays have been given to the committee or been opened, and none of the writers are known by us, one excepted, who signed his real name. This essay is rejected from competition, and the writer agrees to contribute another, in accordance with the terms of the offer.—PUBS.

NEW YORK ODONTOLOGICAL SOCIETY.

A regular meeting of this Society was held at the residence of Dr. E. A. Bogue, Tuesday evening, January 20th, a large number of invited guests being present. President A. L. Northrop in the chair.

The committee appointed at a previous meeting to investigate in regard to the course of six lectures proposed to be given by Prof. Hilgard, upon "Molecular Genesis and Regeneration," reported that about five wood-cuts would be required to illustrate the lecture, costing from $12.00 to $20.00 each ; that the parlors of Dr. Crosby's church could be secured

for $12.50 per evening; which, with the fee to be paid to the lecturer, would make the total expense to the Society about $300.00. On motion, the report was accepted, and the Executive Committee, together with the President, appointed to make all the necessary arrangements to have the lectures delivered; and an assessment, sufficient to defray the expenses, ordered to be levied upon the members.

S. S. White, upon invitation, made a few remarks, stating that he had just returned from Portland, where the suit of the Dental Vulcanite Company had been tried, and from what he saw and heard there, was sanguine of a favorable decision.

Dr. E. Maynard read a paper upon "How to reach the Canals in the Fangs of Teeth in certain cases," a copy of which was, on motion, requested.

Dr. A. C. Hawes wished to know how the pulp cavity in the anterior root of an inferior molar could best be reached, when the cavity of decay was in the posterior approximal surface.

Dr. Maynard advised filling the cavity of decay as a simple cavity, and then drilling through the grinding surface, or downward and inward through the buccal surface, commencing near the grinding surface, into the pulp cavity, thus sacrificing but a small amount of tooth substance, and not lessening in any degree the strength of the crown. Dr. Maynard illustrated his method by diagrams on the black-board.

He related a case in which, several years ago, he had amputated and extracted the posterior half of the crown, and the posterior root of an inferior molar, shaping the crown remaining, as a bicuspid—the removed portion of the crown being much decayed, and the extracted root having a persistent abscess. The result was a perfect success, the tooth doing good service for many years.

Also a case of amputating a portion of the root of an inferior incisor, which protruded through the gum. The gum healed over nicely, and three years after the case was doing well. He performed the operation by drilling a small hole *through* the root at the proposed line of amputation; enlarged it; then with a hoe-shaped instrument cut through the remaining portion at each side of the hole, drawing the shaving of root outwards at each cut.

Dr. T. B. Hitchcock, of Boston, mentioned a case treated by Dr. Dunning, where the posterior root and half of crown had been removed with good result.

Dr. W. H. Dwinelle said he had treated several teeth in the same manner successfully. In several instances had removed roots of supe-

rior molars, leaving the whole crown. He related having five years ago amputated a portion of the roots of eight teeth in one mouth, which were protruding through the gum. Also removed the dead alveoli. Alveoli restored and the teeth all doing well.

He said that in large cavities in the buccal surfaces of the front teeth, the unsightliness of a large mass of gold might be obviated by shaping a piece of enamel, the color of the tooth, to the cavity, placing it in position, and securing it with a narrow ring of gold foil. Mentioned a case where, several years ago, the piece of enamel was cemented in with Beven's filling. The operation was perfect to-day.

Dr. E. A. Bogue read a paper on *"Amalgams," giving various alloys and proportionate shrinkage.

Dr. W. H. Atkinson spoke of a lower molar presented to him a week ago, split to the bifurcation, and greatly inflamed. Had reduced the inflammation, and intended to place a platina band around the tooth to hold the parts together, having first cemented them with os-artificial.

Dr. G. T. Moffat, of Boston, hoped the time would come when patients would understand the necessity of more frequent examinations of the teeth, and members of the dental profession be more thorough in explorations for cavities, and more thorough in their operations, thus avoiding the necessity for such operations upon the pulp cavities and roots of teeth as we have heard of this evening. Showed a central incisor, the pulp canal of which had been filled by the patient with broom straws while in his mouth, one of which had protruded through the foramen one-sixteenth of an inch, causing inflammation and excessive pain, and necessitating extraction.

Dr. T. B. Hitchcock showed a specimen of dilaceration, and two specimens of osseous union of the roots of molar and wisdom teeth. Also models of a mouth in which the lateral incisors had been successfully twisted or rotated into their proper position with the forceps.

A letter was read from Dr. J. H. McQuillen, regretting his inability to have been present at the previous meeting, and enclosing to the Society a wood-cut of sections of a dilacerated central incisor, as seen under the microscope.

On motion, the thanks of the Society were tendered to Dr. McQuillen for the present. WM. JARVIE, JR., *Recording Secretary.*

* Published in last number of "MISCELLANY."

COUNTERFEIT DIPLOMAS.

The establishment on Pine Street, Philadelphia, where medical degrees, regular and honorary, are conferred at so much a head, has been several times sharply overhauled, but has continued prosperous in spite of its overhauling. The greater the discredit into which the "American University of Philadelphia" has fallen at home, the greater the energy with which its business has been pushed at a distance, and the more lucrative its returns have been.

It must be allowed that there is a large element in human nature that likes to be humbugged; otherwise such frail securities as El Paso railroad bonds and Emma mining stocks would never have had a successful run in foreign exchanges, where nothing authentic was known about them, and from the nature of the case it was impossible that anything could be known. Upon this same credulity and conceit, manifested in a different way, the shrewd Yankee operators in university titles have played successfully, and they have found the market lucrative enough to pay for great risks at home. There is a good prospect now that this particular kind of swindling will be brought to an end. Responsible charges have at last been filed, and the "American University" will be called to answer upon what warrant its proceedings are based. The charges come, this time, from Germany, where the sale of bogus titles has been vigorously carried on through resident agents. The chief agency was in charge of "Dr. P. F. A. Vander Vyver, LL. D.," Jersey, England, to whom all persons who wished to be promoted to any degree by this University, without being personally present, were to send their applications, and $120 in money—being the total cost of the diploma.

This eminent doctor of laws advertised extensively in German and other European papers, setting forth the facility of getting degrees in this way, without the usual inconvenience of previous study, or even of a journey to America and back again. Here and there gentlemen of moderately good standing among scholars, have been tempted by Dr. Vander Vyver's prospectuses to bid for these paper titles, and have worn them with great complacency, till the swindle was fully explained to them. The authorities of Philadelphia, in company with the officers of the University of Pennsylvania, with which the bogus University has been confounded, are now at work, with the evidence of its deception in their hands, to bring its officers to justice, or, failing in that, at least to put a stop to their business.—*Boston Daily Advertiser.*

NOTES.

Dr. N. W. Kingsley's very interesting article, prepared for this issue of the MISCELLANY, is omitted only because of failure on the part of the artists to complete the illustrations in time for publication.

[ED.

Transactions of the American Dental Association, 1873.

At the last moment we stop our press to announce the reception of the finest volume which has ever fallen under our eye from an association of any kind.

Our printer pronounces it a "complete job," and estimates that the book would be fairly valued at four dollars per volume.

We have not had time to read it carefully, but its table of contents names the authors of its various articles, and these are a sufficient guarantee of the permanent value of the papers they have presented.

The report of the Committee on Dental Histology and Microscopy is from its chairman, Dr. T. B. Hitchcock, of Harvard Dental College. This report is richly illustrated by nine photographic plates of sections of teeth prepared for his microscopic researches, each plate occupying a page, and its description a page facing the plate.

The Publication Committee, Drs. M. S. Dean, G. H. Cushing, and H. A. Smith, deserve the warmest congratulations for their success in producing such an admirable volume, and the price at which it is offered is a marvel of cheapness, viz.: on fine tinted paper, with histological illustrations, bound in muslin, $2.00. On white paper, no illustrations, paper covers, $1.00.

The number published is limited, and purchasers should promptly address their order to Publication Committe, care Dr. M. S. DEAN, 550 Michigan Avenue, Chicago, Ill.

Dental Department of Harvard University.

At a meeting of the corporation and overseers of Harvard University, held February 11th, 1874, the University Degree, "Dentariæ Medicinæ Doctor," was conferred upon the following gentlemen, viz.:

WILLIS PORTER BATTLES,
EDWARD DWIGHT CARR,
EDWARD EASTMAN FROST,
GEORGE LEONARD MASON,
HORATIO COOK MERIAM,
FREDERIC AUGUSTUS MERRILL,
HANES EUGENE SMITH,
FRANKLIN BAKER STEWART.

THOS. B. HITCHCOCK,
Dean.

The annual meeting of the Dental Alumni Association of Harvard University was held at the Revere House, Bos-

ton, on February 11th, 1874, at three o'clock P. M.

Dinner was served at half-past three, after which speeches were made by Drs. Fillebrown, Hitchcock, and others, and at the resumption of business the following officers were chosen for the ensuing year:

President..... ..S. F. HAM.
Vice President...T. O. LOVELAND.
Treasurer.......EDWARD PAGE.
Secretary........P. B. LASKEY.

On taking the chair, Dr. Ham read an original poem, for which he received a vote of thanks.

Dr. Grant remarked on the death of the late Dr. R. T. Freeman, a member of the Association, and the following resolutions were unanimously adopted:

Whereas, It has pleased the Almighty to remove from our ranks our esteemed friend and brother, Robert Turner Freeman, therefore

Resolved, That we, the members of the Dental Alumni Association of Harvard University, sincerely mourn his loss, and feel that the profession has lost in him a *true man*.

Resolved, That the sympathy of the society be extended to the widow and relatives of our deceased brother graduate, and that a copy of these resolutions be forwarded to his widow.

After a pleasant informal discussion, the meeting adjourned. The occasion was of great interest, and there was a very good attendance.

P. B. LASKEY, *Secretary*.

The New York College of Dentistry.

We have received from the Dean of the faculty of the New York College of Dentistry the following names of gentlemen who have passed a satisfactory examination, and been presented for the degree of D.D.S.

ALBERT DE AGNER,
BERTRAND J. PERRY,
W. A. DIXON,
J. EMILE SERRE,
PHILLIP H. BROWN,
JOSEPH WEDGEWOOD,
IGNATIO GUTIERREZ,
MORDUNT SIGISMUND,
CHARLES E. MERRITT.

Besides these,

D. C. MORSE,
RUFUS G. STANBROUGH, and
WILLIAM J. HEWES,

passed a satisfactory examination, but because under twenty-one years of age, will not receive their degrees this year.

The faculty prize offered to that student who passes the best examination on the studies of the course is this year awarded to Mr. Rufus G. Stanbrough.

Commencement exercises will take place Monday evening, March 2d, 1874, and will consist of

Overture—"Egmont"—Beethoven.

I. PRAYER,
By the Rev. E. P. Rogers, D.D.

"Ave Maria"—from Bach's Fuges"—Gounod.

II. CONFERRING OF DEGREES,
By Dr. S. A. Main, President of the College.

III. AWARDING OF FACULTY PRIZE,
By Prof. Faneuil D. Weisse, M.D.

"Die Liebelle"—Mazurka—Jos. Strauss.

IV. ADDRESSES TO THE GRADUATES,
By Prof. C. A. Marvin, D.D.S.

Selection—Les Huguenots—Meyerbeer.

V. VALEDICTORY,
J Emile Serre, D.D.S., of the Graduating Class.

Galop—"Im Sturmschritt"—John Strauss.

VI. ADDRESS.

BENEDICTION.

March—"Barcarole"—Downing.

Music by D. L. Downing's 9th Reg't Band.

COLORED PLATE

OF THE

Trigeminus, or Fifth Nerve.

THE SUPERB ANATOMICAL PLATES OF

L. HIRSCHFELD & J. B. LÈVEILLÉ

Have as yet no equals, and among them all, the Plate of the Trifacial Nerve is prominent because of the clearness and accuracy with which it portrays the course of the Nerve, its various branches, and the position of the arteries and adjacent parts. The Anterior and Posterior Dental Branches of its Superior Maxillary Division, and the Inferior Dental Branch of the Inferior Maxillary Division, are particularly and beautifully shown, *with their ramifications to the roots of the teeth*—so that nothing can be more useful to the student, or better adapted to the demands of the teacher, or to the purposes of explanation in ordinary practice, than this plate.

This should be framed and hung up in the office or study of every medical or dental student or practitioner. It is not only an excellent work of *art,* but by far the readiest and most accurate work of *reference* in the office. It is accompanied by a pamphlet key.

This we have reproduced, on the finest plate paper, of the exact size and coloring (hand colored) of the original French Plate, and as perfect in every respect.

PRICE, - - - $2.00.

COST OF SENDING, 10 CENTS.

JOHNSTON BROS.,

812 BROADWAY, N. Y.

THE

Morrison Dental Chair.

Price, $150.00. Boxing, $5.00. Spittoon Attachment, $8.00.

It possesses great superiority over any chair before offered to the profession, and is at the same time less expensive than any other first-class chair. Some of its points of superiority we here enumerate :

1st. All the advantages of any low-based chair, and also of any high-based chair, are here secured in a single chair. In it the patient can be placed lower than in the lowest-based chair made, or higher than in any other of which we have knowledge. At its lowest position the seat is fifteen inches, and at its highest position forty-two inches above the floor.

2d. The operator using the Morrison Chair can either stand or sit at his work, as he may choose, working with equal convenience in either position.

3d. It has been a very general complaint that dental chairs are too wide at the back, so holding the operator away from his work. Here this difficulty is overcome. The chair is narrow at the back, so that the operator need not stretch to reach the patient, but *can lower either arm of the chair out of the way* and so be as near the patient as he may choose.

4th. It can be changed from its lowest to its highest position in seven seconds—a celerity impossible in any chair raised by a screw.

5th. It can be very readily and perfectly adapted to operations on children of any age

First. Because in it the child can be raised as high as needed for the tallest operator.

Second. It provides a comfortable back and head rest, exactly as for grown persons.

Third. The footstool can be lengthened or shortened, to suit children of any size.

6th. The back of the chair can be lengthened or shortened rapidly and at will.

7th. The lower part of the back can be thrown forward to support the small of the patient's back.

8th. The chair, when adjusted to any position, is firm or steady wherever placed, and this is *especially true of the head-rest.*

9th. It occupies less room than any other operating chair.

10th. Although the footstool, when at its extreme length, is much longer than any other made, yet a person of ordinary weight can stand on its extremity without tipping the chair.

Nota Bene.—We have substituted brass cogs and castings, for those that experience has shown in any degree faulty, and the chair, *as now sold, is as strong as any chair made.* Reference is made to this because several of the chairs first sent out, failed in the cogs by which the chair is raised, and in the castings which throw the lower back-pad forward. These have been replaced in every instance with brass cogs, without charge on our part, and to the complete satisfaction of the purchaser.

We are gratified in being able to refer to the commendations, which follow, from some of the leading practitioners of the country.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

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10 W. 11*th St., New York, July* 24*th*, 1873.

MESSRS. JOHNSTON BROS., Broadway:

I find your Morrison Chair gives great satisfaction. My patients all admire, and voluntarily pronounce it the easiest they ever sat in. The movable back-piece, arms and foot-rest, which latter the patients can adjust at pleasure without changing their position, the lowering of the whole chair, which admits stepping into it without the slightest inconvenience, are points which call forth immediate praise from the patients, and give great satisfaction to the operator.

As a child's chair it is invaluable; the little patients can be "put just where you want them," while the operator can with ease change the position of the *whole* chair, without disturbing the patient in the least. These points, combined with others which it has, make this chair the most desirable of any which I have seen. Very respectfully yours, A. L. NORTHROP.

JOHNSTON BROS., *Hartford, June,* 15*th*, 1873.

GENTLEMEN: I have used the new Morrison Chair several hours every day since its arrival here, and feel in duty bound to say that there is no chair manufactured that can compare with it.

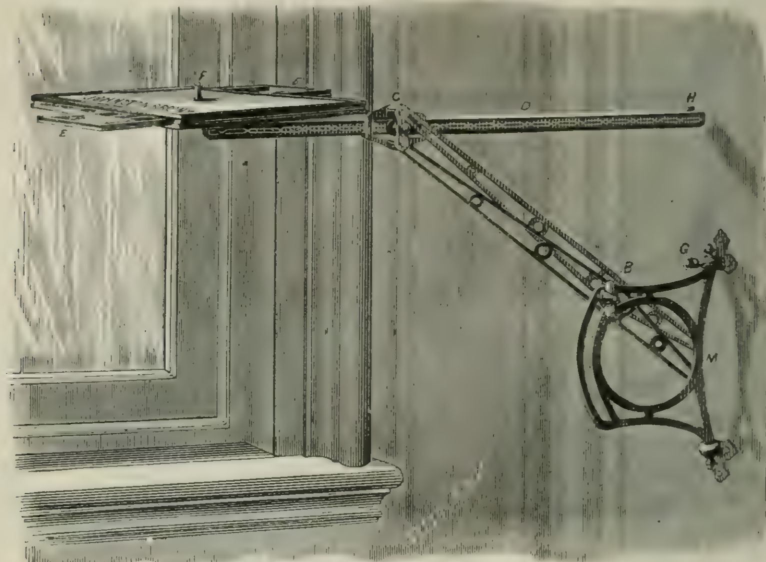
Its adaptability to children as well as adults, support for the small of the back—in fact, all its motions are perfect, and I see no chance for improvement. Dr. Morrison and yourselves have my heartfelt thanks for the great benefits you have conferred upon the profession in perfecting the chair as well as the Dental Engine. Very truly yours, GEO. L. PARMELE, M.D., D.M.D.

MESSRS. JOHNSTON BROS., *Hartford, July* 24*th*, 1873.

DEAR SIRS: The Morrison Chair meets all my expectations. I like it very much; in fact, I feel perfectly satisfied that I have one of the most complete chairs yet made for the comfort of patients and the convenience of the operator.

Yours truly, JAS. McMANUS.

MORRISON DENTAL BRACKET.



Price, $25.00. Boxing, $1.00.

The cut represents the table in its highest position, and distant from the wall a little more than half the distance it is capable of taking. By loosening the thumb-screw B, and allowing it to rest in the bottom of the slot, (instead of at the top as represented here,) the table will occupy a position as much below M as it now does above the same point. The extreme range, that is, the distance between the table when at its highest and its lowest position, is 24 inches.

M represents a metal frame which is secured to the wall or other support by screws. It swings from side to side as a gate on its hinges. C. M. represent light but strong metallic arms, hinged at M as a centre and moving up or down. At B is a thumb-screw passing through a slot in the frame M. By it the arms can be firmly clamped at any desired height.

At C is a slide-rest through which the hollow rod D passes freely, and may be clamped at any distance from its ends. At one end of this bar a square table is supported, having in it foil and instrument drawers. This table is capable of rotation round F, which is the burner of an alcohol lamp, the alcohol being contained in D and introduced at its further extremity H. Among the advantages of this bracket are these:

1st. It combines a greater variety of range and movement than any other.
2d. It is rigid in whatever position it is clamped, and will hold 15 lbs. with steadiness.
3d. It provides a clean receptacle for foil and instruments.
4th. It is obvious that a square table is very much more convenient as an instrument stand than a round one.
5th. Its drawers extend through the table and can be opened from either side.
6th. To those having a Morrison Chair it is almost indispensable, as it will follow the chair to either its lowest or its highest position.

It is handsomely ornamented and nickel-plated throughout, so that it is a very beautiful addition to the furniture of the operating room.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

IMPROVED
Morrison Dental Engine.

We shall commence filling our orders for these engines about the middle of this month, but will not be able to supply the demand, on receipt of orders, before the ensuing month. We will do all that can be done consistent with thorough workmanship to hasten the manufacture of both this and the Suspension, or Elliott Dental Engine. The improvements made in the Morrison Engine cannot be well explained without an illustration (which will be given in our April MISCELLANY), but are, briefly, the following :

1st. The rocking movement of the upright standard is abandoned, and a rigid, handsomely plated, and tapering column substituted.

2d. From the top of this column extends an arm directly in front of the patient. This arm swivels upon the column, and is adjustable vertically, being secured by a brace at any height desired, thus bringing its end directly in front of the patient's mouth, whatever be the height of the operating chair.

3d. Attached to the end of the adjustable arm by a most ingenious universal joint, is a shaft about twelve inches long (corresponding to the extension arm of the old engine), which carries at its end the handpiece.

- *a*. This shaft, being short, is much lighter than the old one, enabling the operator more perfectly to feel his work, and is also less liable to tremor.
- *b*. Both sides of the mouth may be reached without changing the position of the engine.
- *c*. By lowering or raising the adjustable arm, according as the operation is upon the superior or inferior teeth, the driving spring is but slightly flexed, and great steadiness secured.

4th. The off-centre spring is attached above the driving wheel, partially supporting it and reducing the friction.

5th. The handpiece is much smaller, and the burs so secured that they may revolve in either direction, and at the same time be used either with a pushing or pulling cut, and this without the use of a catch spring. Old style burs can be refitted to this handpiece.

The model engine of this pattern, as above described, has been for several weeks in use in the hands of one of the best operators in our city, and is pronounced by him a very decided improvement.

JOHNSTON BROS.

JOHNSTON BROTHERS,

Dental Depot,

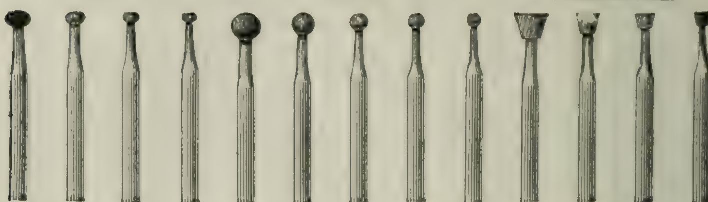
812 BROADWAY, NEW YORK.

Equipment for Morrison's Dental Engine.

PLUG FINISHING BURS.

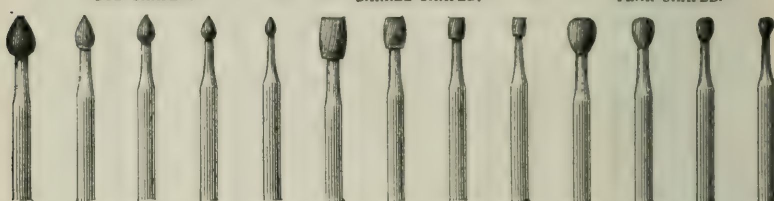
1

OVAL. ROUND. INVERTED CONE.



2 3 4 5 6 7 8 9 10 11 12 13 14

BUD SHAPED. BARREL SHAPED. PEAR SHAPED.



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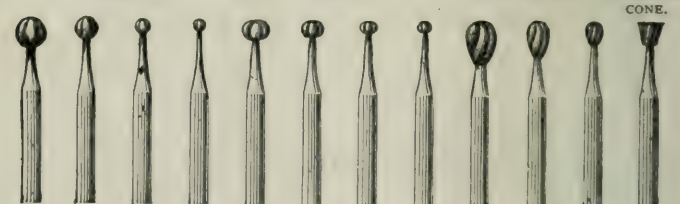
BURNISHERS.

ROUND. OVAL. PEAR SHAPED. INVERTED CONE.



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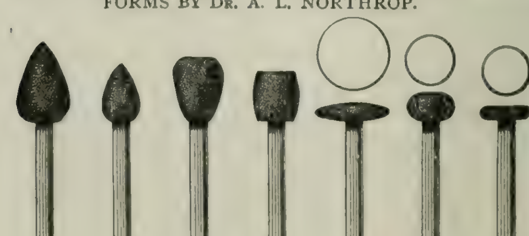
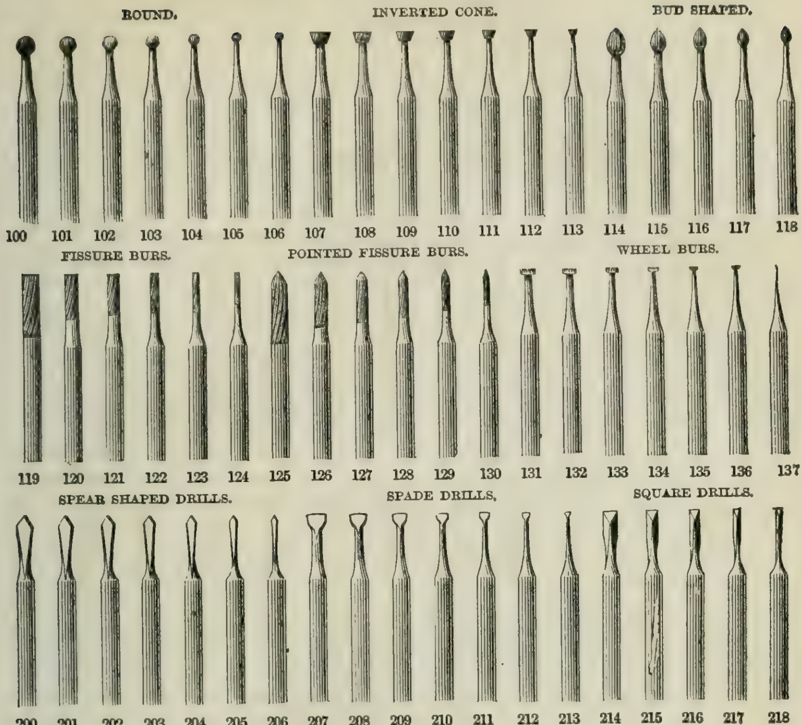
CORUNDUM POINTS FOR MORRISON ENGINE.

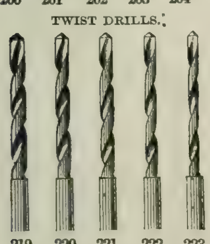
FORMS BY DR. A. L. NORTHROP.

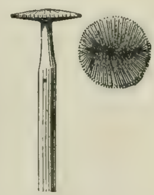


75 76 77 78 79 80 81

CAVITY INSTRUMENTS.







Price, $1.25.

CAVITY INSTRUMENTS FOR RIGHT ANGLE ATTACHMENT.

We have in stock, and can furnish *Cavity Instruments* for the *Right Angle Attachment*, of all styles and sizes, from Nos. 100 to 218, inclusive.

SCOTCH STONES, MOUNTED.

The Scotch Stones enable the operator to give a finish to fillings hitherto unattainable, and only need a trial to be appreciated. We have these in stock of forms Nos. 75, 77, 80 and round. Other kinds of stones are now in process of manufacture.

HINDOOSTAN STONES, MOUNTED.

Forms of Nos. 75, 77, 80, and round. Of each shape we make three sizes. The cuts referred to by the numbers represent the large size. These are, beyond doubt, of the greatest utility in cutting either gold or bone. They last longer than any other stone.

LEATHERS, MOUNTED.

We have in stock Leather Points mounted on Mandrils, of forms Nos. 75, 77, 80 and round, designed to be charged with powders, for polishing and finishing fillings.

Screw Mandril, to be armed with leather, wood, etc., for polishing fillings, cleaning teeth, finishing plates, etc.

PRICES.

Finishing Burs,	Per dozen,	$6 00
Stoned Finishing Burs,	Each,	1 00
Cavity Instruments and Screw Mandril,	Per dozen,	3 00
Stoned Cavity Burs,	Each,	50
Right Angle Cavity Instruments,	Per dozen,	3 00
Leathers, Mounted,	"	3 00
Hindoostan Stones, Mounted,	"	6 00
Scotch Stones, Mounted,	"	3 60
Burnishers,	"	9 00
"	Each,	0 75
Corundum Points, Mounted,	Per dozen,	1 50
" " not Mounted,	"	0 75
Bands for Engine,	"	1 50
Twist Drills	Each,	40

IN ORDERING INSTRUMENTS DESIGNATE THEM BY THEIR NUMBERS, AND STATE WHETHER THEY ARE WANTED TO FIT THE OLD OR NEW STYLE HAND PIECE.

Especial attention is called to our burnishers. They have been most cordially endorsed by our most prominent operators.

Purchasers of the new style improved hand piece will have all of their old stock of burs fitted to the new hand piece, free of charge, by sending them to us either by mail or express.

☞ Our instruments are all made of the best Stubs' steel. We shall spare no effort to make them equal in every respect to anything offered to the profession.

☞ We are constantly adding new forms and sizes of Plug Finishing Burs, Cavity Instruments, Drills, etc.

DIRECTIONS FOR USING THE ENGINE.

1. In lifting the engine, be sure *not to bend* the arm which carries the hand piece.

2. Whenever the least noise is heard, oil the engine with the best sperm oil. The rapidity of motion renders oil a necessity.

3. The only part at all likely to break, is the small spring, which conveys power at the upper end of the hand piece. It is not soldered to the shaft, but is slipped on by hand. To put on a new spring, take hold of it near the end opposite that you apply to the shaft, and twist as if to *uncoil* the spring, at the same time pushing the spring on to the shaft. You will be greatly aided in removing the broken parts, by twisting, as if to uncoil, the spring. A piece of emory paper will be found convenient to aid in holding the polished shaft.

4. The engine, to run satisfactorily, should be oiled daily ; and the driving-spring should be perfectly straight.

IMPROVED INSTRUMENTS.

WE HAVE ADDED to our list three new and very popular sizes of Cavity Burs. One round called 106½, one inverted cone called 113½, one wheel-shaped called 137½. Each is smaller than any before made by us, of its shape. These numbers are neatly put up in dozen and half dozen packages, and are completely protected from oxidation and from rubbing against each other in transportation.

They are very popular, and we frequently receive orders from dentists for from one to three dozen of each.

STONED BURS FOR BURRING ENGINES.—For some time past, we have made to order, a Bur for use in Burring Engines, by the following process : The teeth of the Bur being laid out with extreme accuracy, are filed to *exactly the same length,* but are not brought to a cutting edge. The Bur is now tempered, and each tooth *afterwards stoned to a fine edge.* This secures a Bur perfect in all its cutting edges, and unequaled by anything hitherto offered in the market. Of these we are provided with a limited supply, of both Cavity and Finishing Burs, excepting Fissure *Burs.* **(See Price List.)**

THIN BOXWOOD DISCS for carrying Polishing Powder, to polish fillings in proximal cavities. These are of four sizes, from ⅝ inch to 1 inch diameter.

WE ADD THAT THE INSTRUMENT-STAND, elsewhere illustrated, will be found very useful for the convenient keeping of the Engine Instruments while not in actual use.

Besides the form represented in the cut, we have them with smaller holes, and very many more of them, so that each Bur may be kept by itself.

WE INVITE the fullest examination of our Engine Instruments, as regards

The quality of the steel from which they are made.

The shape and finish of the cutting edge.

Their temper.

The rapidity with which they cut.

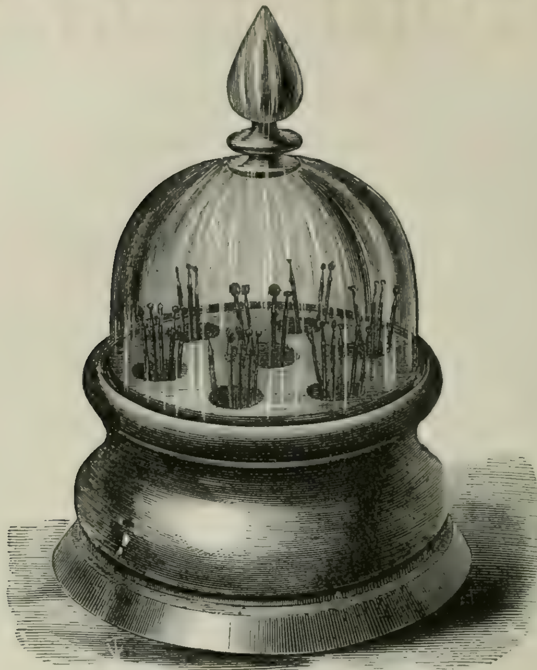
Their durability.

The shaft of each instrument is *round and highly finished,* and can therefore be used without unreasonable and unnecessary injury to the nose of the hand-piece, which injury occasions unsteadiness in all the uses of the Engine.

They will *bear* examination in *quality* and *price.*

JOHNSTON BROS.

INSTRUMENT STAND FOR ENGINE BURS.



Price, $2.50.

No. 1 as above. No. 2 with many more, but smaller holes.

This is made of rosewood and maple in alternate layers, and is very ornamental. Besides the form shown above, we have another like this in all respects except that the holes into which the burs are placed are made so small as to hold only one or two instruments in each. We call this No. 2.

JOHNSTON BROS.

CARVACROL. $C.^{20}$ $H.^{14}$ $O.^{2}$

HIGHLY RECOMMENDED.

PROPERTIES:—Locally applied, Carvacrol, in full strength or diluted, seems to possess antiseptic, disinfectant, sedative, mildly caustic and escharotic, gently styptic, stimulant, irritant and rubefacient properties.

Carvacrol, as a substitute for Glycerole of Thymol and Creosote or Carbolic Acid, in cases of Odontalgia, Sensitive Dentine, Alveolar Abscess, "Canker Patches," etc., may be locally employed in the same manner.

As a gargle for Tonsillitis and inflamed mucous membranes, it may be employed in the proportion of about three drops to the ounce of water, or the strength can be increased when more powerful action is required.

Price per Bottle, $1.00.

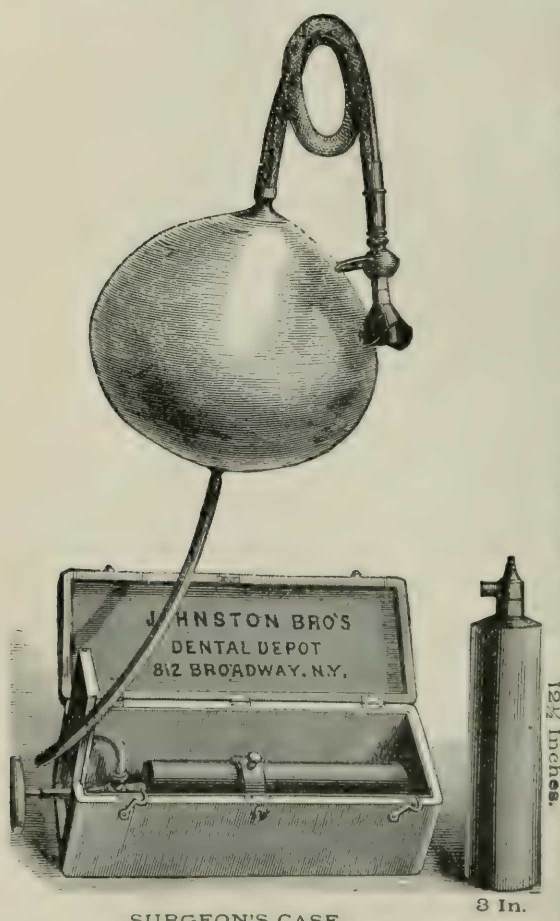
H. L. SAGE, D.D.S.

For Sale by JOHNSTON BROS.

LIQUID NITROUS OXIDE.

[Revised Circular.]

The increased and still increasing demand for Pure Liquid Nitrous Oxide, and for information concerning apparatus for its exhibition, renders it necessary that we issue yet another edition of our circular upon that subject As the Surgeon's Case, as first introduced, has proved itself in every way all that we could wish it to be for the place assigned to it, we cannot do better than to repeat here our first description of it.



SURGEON'S CASE.

This comprises a strong cylinder containing One Hundred Gallons of Gas: a strong morocco covered case, provided with an iron ring and set screw, by which the iron cylinder is held in place during use, and its delicate valve protected from injury; also, a rubber bag with rubber tube at one end for admission of gas, while an inhaling tube, handsomely covered on its outside, and provided against any possibility of a collapse by a tin-coated spiral of wire on its inside, is fastened at its opposite end—an inhaler—a nickel-plated wrench and a nickel-plated key. In fact, *all* the apparatus necessary for administering the gas. The whole case and contents weighs about fifteen pounds. This is here shown as open, and the bag which receives the gas from the cylinder, and from which it is exhibited to the patient, is represented as filled, and suspended above the case. The cylinder is also shown as standing at the side of the case. This is the simplest and most popular form of apparatus, and will be everywhere welcomed—because of its portability for use outside of the operating room.

The first letters of recommendation we published are of so cheerful and enthusiastic a character, that we cannot feel satisfied to lay them aside. We, however, add a few of more recent date. The more we examine the statistics of anæsthetics, the more thoroughly are we convinced that whether we would suit the real interest of either surgeon, dentist or patient, no other anæsthetic should be used.

One single argument in favor of Chloroform and Ether over Nitrous Oxide can be adduced—they are cheaper.

Per Contra—examine the evidence below.

From a careful examination of the statistics of 200,893 cases, Prof. E. Andrews gives, in the *Chicago Medical Examiner*, the following estimate of the relative danger from different anæsthetics:

Sulphuric Ether	1	death to	23,204	administrations.
Chloroform	1	"	2,723	"
Mixed Chloroform and Ether	1	"	5,588	"
Bi-chloride of Methylene	1	"	7,000	"
NITROUS OXIDE	no	**Deaths in**	**75,000**	"

[*Dental Cosmos.*

Edward R. Squibb, M.D., than whom our country has no more able pharmaceutist and toxicologist, in a lecture on anæsthetics before the Medical Society of the State of New York, says: "Nitrous Oxide was the first anæsthetic; and the safety and certainty of its effects, even in inexperienced hands, for all momentary operations, and the promptness with which persons recover from its use, render it perhaps the most important of all anæsthetics, because destined to relieve a greater aggregate amount of pain, *with greater safety*, than any other agent."

Again—"If the surgeon considers the safety and saving of pain to his patient first, and his own convenience in operating, second, he will hesitate before passing over such an agent as Nitrous Oxide."

It may be well just here to call attention to the fact that, when ether or chloroform is administered, it is not at all uncommon for the air about the patient to become so charged with the vapor as to somewhat affect the surgeon, taking from him perfect clearness of mental operation, and of the senses, and frequently leaving him with headache, and even nausea.

When Nitrous Oxide is given, nothing of this occurs, and the surgeon is in no way conscious of the presence of the anæsthetic, except as he sees its effects on his patient. This, we think, is a convenience to the surgeon.

Numerous and repeated trials of the Liquid Nitrous Oxide in capital operations in surgery, (as well as in momentary operations), during the two years just passed, attest the perfect adaptability of this agent to all cases where an anæsthetic is needed, and the time will not be very distant when it must supplant the use of its cheaper, but dangerous rivals.

Why Nitrous Oxide should be preferred to Ether or Chloroform.

1*st.* It is far safer—see statistics above. Dr. Colton reports having administered it to thousands of patients, without a single accident.

2*d.* It acts quickly; from one to two minutes being generally sufficient to bring a person completely under its influence.

3*d*. It seldom excites a patient to violence—a matter of great importance.

4*th*. Nausea is not often excited, even during a long operation. Eating, however, should not immediately precede the administration of the gas. It is contended by some operators of large experience, that *pure* nitrous oxide *never* causes nausea. In operations of the eye, or in the pelvic region, this peculiarity renders the gas invaluable, and it always is of much value to the patient's feelings.

5*th*. The shock given to the system by other anæsthetics, is almost as severe as the operation itself, and a slow return to consciousness and the normal condition detrimental to the recovery of the patient. Nitrous Oxide frees itself from the system as speedily as it produces its effects, and so adds nothing to the perils of surgery.

6*th*. It is no small advantage, as before recited, that, while using Nitrous Oxide, the operator feels no inconvenience from its effects, as he does not inhale it, while he cannot altogether escape the fumes of ether or chloroform.

We append a few Letters and Extracts from Letters received from those who have tried the apparatus.

JOHNSTON BROS. *New York, October* 13, 1871.

MY DEAR SIRS:—This afternoon I used the LIQUID NITROUS OXIDE you sent me, in an operation by Dr. J. Marion Sims, in presence of Drs. J. C. Nott, Walker and Nicoll. I have produced anæsthesia rapidly, and *kept it up for fifty* (50) *minutes without intermission*, to the great delight of us all. This is probably the first time in America (possibly in the world) that anæsthesia has been kept up for this length of time with Liquid Nitrous Oxide Gas. I expect to use it again in a few days, in a case of ovariotomy. Please send me a charged cylinder and face-piece. Yours truly,

D. H. GOODWILLIE.

Extract from Letter of Dr. J. Marion Sims.

267 *Madison Avenue, New York, Jan* 25, 1872.

Messrs. JOHNSTON BROS.

Since last September, I have performed a great many operations on patients under its (Liquid Nitrous Oxide) influence. Many of these took the gas for 20, 25, 30 and 35 minutes. One took it for (50) fifty minutes, and I saw no reason why she could not have safely taken it for twice that length of time. Dr. Goodwillie has given the gas to two ovariotomy cases for me, one for 27 minutes, the other for 31 minutes. In these it was all that I could wish.

Truly Yours, J. MARION SIMS.

Hopkinton, N. Y., March 18, 1872.

Messrs. JOHNSTON BROS.

I have again exhausted my cylinder, which I received January 10, and I have drawn out 28 doses. I have heard the complaints of cylinders not holding out, but I think they do not shut them tight. I have now had three cylinders, first one had 25 doses; second, 24, and not all out; third, 28 doses. Enclosed please find cylinder to re-fill, and $6.

Yours truly, J. A SHELDON.

Hopkinton, St. Lawrence Co., N. Y., January 20, 1873.

Messrs. JOHNSTON BROS.

I would cheerfully say a few words in favor of your Liquid Gas apparatus. I have taken it after keeping it four months, and again as soon as the bottle was received, and could see no difference, only I thought that the old was the strongest. I have practiced taking it for the last ten years, and one week ago to-day, I gave a single dose, and extracted 23 teeth and roots, with no symptoms of pain until the last one, and had it not been for the blood, I would have got the remaining 1 tooth and 2 roots.

Truly yours, J. A. SHELDON, D.D.S.

Messrs. JOHNSTON BROS. *Reading, October* 17, 1872.

DEAR SIRS:—Enclosed find $25, which place to my credit; the balance will be forthcoming shortly. The cause of my not having used any Liquid Gas lately, is that I have been considering the expense, trouble, etc. I have now concluded to use it altogether, as I find it more satisfactory both to myself and patients.

Please send me at once this bottle re-filled.

Yours respectfully, F. HICKMAN.

JOHNSTON BROS. *Red Bank, N. J., December* 18, 1872.

SIRS:—I have used several bottles of your Liquid Nitrous Oxide Gas. I have not only administered it to my own patients, but in several surgical operations performed by Dr. G. F. Marsden, when anæsthesia was kept up from one to fifteen minutes with perfect success. *I have not had a single case in which it was not successful.*

Respectfully, CHAS. H. WHITE.

Messrs. JOHNSTON BROS. *Trenton, April,* 1873.

SIRS:—Please send Cylinder of Gas as soon as possible. Yesterday I administered it successfully for quite a serious surgical operation, keeping the lady under the influence near twenty minutes. Surgeon from your city.

Yours, CHAS. DIPPOLT.

Wallingford, Conn., April 24, 1873.

Messrs. JOHNSTON BROS.

GENTS:—Herewith please find empty cylinder. Please send me another charged with gas per return express if possible, and bill. I gave the last dose of gas the other contained the other day; it had been kept three months, and I found it good as new. Am very much pleased with the Surgeon's Case, and become more attached to it every day I use it.

Yours truly, JARED G. KIMBERLY.

JOHNSTON BROS. *New York, October,* 1873.

Please send us another "Cylinder of Gas" just as the last one, out of which we got over sixty-two (62) dollars. "This is cheapness indeed."

Yours, etc., M. P. B.

40 *Beaver Hall Terrace, Montreal, December,* 1873.

Messrs. JOHNSTON BROS.

DEAR SIRS:—I have been using Morrison Dental Engine and Bracket, as well as your condensed Nitrous Oxide, for some time. They suit me so admirably that I don't see how I could manage to get along without at least the former and the latter. Yours, W. GEO. BEERS.

REVISED PRICES.

Complete Apparatus—Surgeon's Case. . . **No. 1.**	$40 00
Complete Apparatus—Surgeon's Case, with extra sized Bag and Metallic Inhaler. . . . . **No. 2.**	45 00

Boxing either, $1.00.

Each complete apparatus includes a 100 gallon cylinder, filled with Liquid Nitrous Oxide.

Cylinder with 100 gallons of Gas.	16 00
Refilling Cylinder.	6 00
Morocco covered case, with ring and thumb screw, velvet lined,	12 00
Polished bl'k walnut " " " " "	13 00

Of these latter we have only a limited number.

Rubber Bag, with covered inhaler tubing, (about 4 gall. capacity)	5 00
Rubber Bag, with covered inhaler tubing, extra size.	7 00
Inhaler, with spring valves, trumpet mouth-piece, with Plated connection.	8 50
Inhaler, latest style, with two way stop cock, adapted to the use of both dentists and surgeons, with connection.	9 50
Key, Nickel Plated.	1 50
Wrench, "	50
Union, Nickel Plated, (nut and tube), for connecting cylinder and gas bag.	1 50
Covered Inhaler Tubing, per foot.	50
Plated Connection to fit old style Inhaler.	1 00

REMARKS.

When the side of a bag has been perforated, it cannot be repaired, but should be replaced. Send on the tubing by mail, and the bag will be replaced. Price.	3 00

As this cannot be done *properly* except by the use of rubber cement, and by persons experienced in the business, we think it every way advisable that it be entrusted to the rubber workers, and not attempted by the dentist.

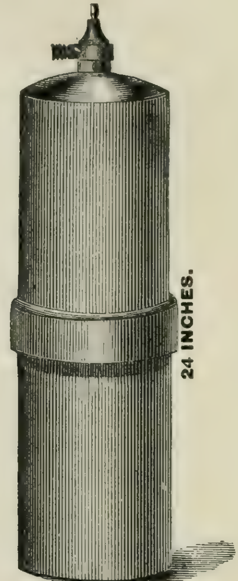
JOHNSTON BROS.,

812 BROADWAY, N. Y.

ONE THOUSAND (1000) GALLONS GAS,

LIQUID NITROUS OXIDE.

1000 GALLON CYLINDER CASE.
Price, $30.00. Boxing, $2.00.



1000 GALLON
CYLINDER.
Price, $36.00.
Boxing, $1.50.

Gas in 1000 gallon lots, 4½ cents per gallon.

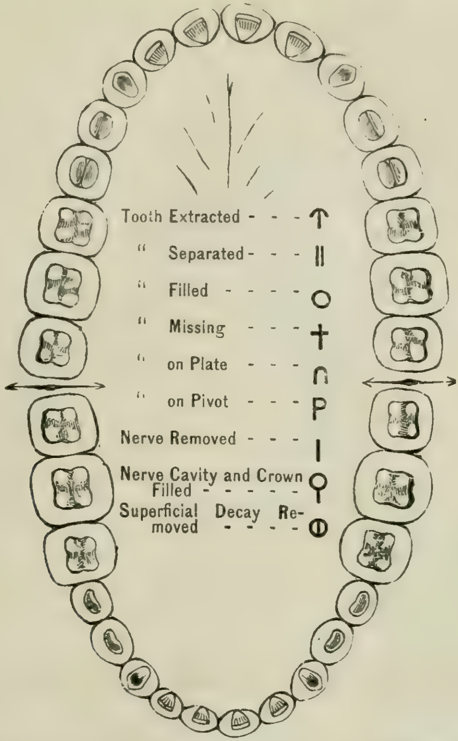
The above illustrated apparatus is especially desirable where large quantities of nitrous oxide are used, or where it must be sent a great distance. In this form it is best to ship it by *fast freight*—which makes the cost of transportation very light.

THE GAS CAN BE KEPT FOR ANY LENGTH OF TIME,

AND IS

CONSTANTLY ON HAND AND ALWAYS OF THE BEST QUALITY.

EXAMINATION TABLETS.



These are put up in Pads of 100 Each. Price 50 Cents.

Having this diagram of teeth on one side, and ruled for dollars and cents on the other, they will be found very convenient in making a diagram of any examination of a patient's mouth, or in sending to a parent an approximate estimate of the amount of work needed in a child's mouth.

JOHNSTON BROS.

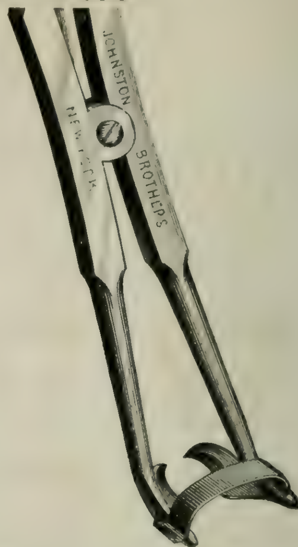
NICKEL-PLATING.

Forceps, Foil Shears, and other Dental Instruments can be kept neat, with little trouble, if thoroughy plated with Nickel. Instruments sent us to be plated will receive immediate attention—be thoroughly plated and promptly returned.

JOHNSTON BROS.

RUBBER DAM CLAMP FORCEPS.

Of these we offer two styles, both deservedly popular.



POINTS OF DR. T. C. ROYCE'S

Rubber Dam Clamp Forceps,

Shown with Clamp. Handles are exactly like the other style, (Bowman's.)

Both styles of these Forceps have points accurately adapted to the shape of the clamp at the neck, and hence will be found much more convenient than those hitherto offered the profession in this point of adaptation. (See also advertisement of Clamps.)

If so ordered we can supply either style of Forcep with a band, which will keep the Forcep and Clamp extended and ready for use when the hand of the operator is removed, as shown on the Bowman Forcep.

PRICES.

Forcep, either style	$3.00
" " " Nickel Plated	3.50
Complete set of Clamps, embracing eight forms	4.00
Complete set of Clamps, embracing eight forms, plated	4.80
Clamps, each	50
" " plated	60

JOHNSTON BROS.

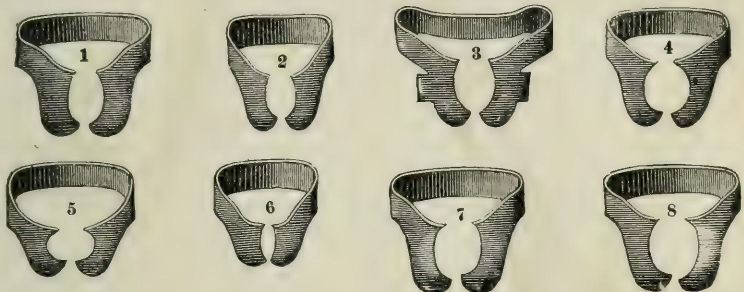
We were never more sure of doing signal service to the Dental Profession than now in offering the

IMPROVED

Rubber Dam Clamps,

INVENTION OF

DR. DELOS PALMER, OF NEW YORK.



Price, set of Eight, { Oil finish, $4.00. Each plain, 50 Cents.
Nickel plated, 4.80. " Nickeled, 60 "

For use with Rubber Dam Clamp Forceps.

These Clamps are designed to be placed on the tooth at the commencement of the operation. Afterwards apply the Rubber Dam by passing it over both tooth and clamp.

DESCRIPTION.

Nos. 1 and 2.—Universal Clamp for Molars.

No. 3.—For posterior cavities in molars standing alone.

No. 4.—For third molars, or any molar of a cone shape. This Clamp can oftentimes be turned around while on the tooth, so as to place the bow of the Clamp out of the way of the operator.

No. 5.—For biscuspeds.

No. 6.—For lateral and central incisors.

Nos. 7 and 8.—RIGHTS AND LEFTS.—For cavities under the gum, on the buccal or lingual surface of molars.

Cuts of two favorite styles of Rubber Dam Clamp Forceps will be found on another page.

These Clamps have prominent points of marked superiority over those of other manufacturers.

First. Each has been carefully adapted to the shape of the tooth for which it is designed, *under the personal supervision of Dr. Delos Palmer*, the inventor.

Second. A groove is made by us in the clamp, into which the forcep nicely fits, so that the clamps firmly hold their position on the forceps, when once adjusted, instead of tilting from one position to another—as is the case when no groove is provided.

JOHNSTON BROS.

NEW YORK COLLEGE OF DENTISTRY,

EIGHTH ANNUAL SESSION,

1873-74.

FACULTY.

WM. H. ALLEN, Emeritus Professor of the Institutes of Dentistry.

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THE ADVANTAGES OF CAPPING PULPS OF TEETH.

By Dr. F. E. Howard, Geneseo, N. Y.*

It was allotted me this subject, that I might contribute my mite in behalf of the science of Dentistry, and this I most cheerfully do, and if it reflects one spark of light upon this important subject, I shall feel amply repaid for the little time spent in collecting these thoughts together.

About four years ago I made my first attempt upon capping an exposed pulp of a tooth. The subject was a young lady about eighteen, of a scrofula and inflammatory diathesis. The record of the case is as follows:

Miss M. presented herself for examination of the teeth, May 2nd, 1869. Her right lateral superior incisor was badly decayed, the pulp exposed, and bled from excavating. I filled with oxychloride of zinc alone, and dismissed my patient for a future sitting. In a few days she called. During her absence she had suffered considerably from pain in the tooth, and upon examination I determined to remove the filling. I found the pulp in a congested state. I decided to make an application of arsenic and extirpate the pulp. This was done, and the canal filled and the tooth saved by this method of treatment.

My second attempt was no more successful than the first, but this did not discourage me. The third proved a success; for one year after I had capped the exposed pulp in this case, I cut away the chloride of zinc filling and found the pulp alive. It had not in this length of time

* Read before the Seventh District Dental Society at Rochester, N. Y.

protected itself by a deposit of secondary dentine. I capped again and inserted a permanent gold filling. One year after the last operation the pulp was alive, and no better result could have been desired.

In this case the patient was of a sanguine lymphatic temperament.

Case 7 was that of a young man eighteen or nineteen years of age, of a sanguine temperament. The tooth was a right superior lateral incisor. The pulp was badly exposed in excavating, for I restored the last portion with a contour filling which was completed at the same sitting. This case comes under my observation often ; I made a close examination of the condition of things but a short time ago, and I know that the tooth contains a live pulp that performs its functions with its associates. The case was treated in June, 1870.

Case 10 was that of a young man about eighteen, of a sanguine bilious temperament. The pulp was not exposed so that it bled. I made an application of Hill's stopping to the pulp, and filled with amalgam at the same sitting, and at the present day is a successful operation, after a test of over two years. This case is brought to your notice more particularly to show that success can be obtained with other materials beside oxychloride of zinc, but the latter is much preferred, for reasons that will be spoken of hereafter.

Case 15 was that of a lady forty years of age, of bilious temperament. The tooth was the first right inferior bicuspid. The pulp was badly exposed, and bled from excavating. I looked upon it as being rather a doubtful case. It was a distal approximate cavity, difficult of access on account of the backward inclination of the tooth.

I was not permitted to cut away into the grinding surface of the tooth as much as I should have done if it had been less sensitive. The pulp was capped with oxychloride of zinc and filled with amalgam immediately.

Two years after, the filling became loose and she presented herself again.

At this sitting the cavity was excavated almost to my entire satisfaction, though normally sensitive.

All of the oxychloride of zinc was removed, and the pulp was beautifully protected by a deposit of secondary dentine.

After properly excavating, the tooth was permanently filled with gold.

Case 20 proved a failure, but I am inclined to think it was because the cap was broken upon introducing the gold, as the zone of the exposure was considerable; being a cavity upon the buccal surface of an

under molar, it was difficult of approach and hard to control the flow of saliva.

I took some chance in this case as to what the result would be. I was quite of the opinion that I should not be crowned with success, and I was not; for about one year after I found the pulp dead.

I was, however, successful in capping another pulp for the same patient.

Case 31 was that of a young lady twenty years of age, of a scrofula diathesis. The tooth was the left central superior incisor. This was considerably lopped over the right central, and in excavating I had to necessarily expose the pulp so that it bled. I capped in the usual way and filled with gold.

Eight months after, the filling became loose on account of the cavity not being shaped as I should have had it, were it not for encroaching upon the pulp to too great an extent. The lady presented herself again, and at this sitting I shaped the cavity quite satisfactorily to myself, without removing all of the oxychloride of zinc, and refilled again. To-day the tooth performs its function as regularly as any of its neighbors. It was first capped February 3rd, 1871.

Case 35 was that of a young man aged twenty-two, of bilious temperament. Tooth, first superior molar, proximate cavity. Capped and filled with amalgam at the same sitting.

Over two years after, decay had occurred, so that it was necessary to remove the filling and refill. I again exposed the pulp, capped as usual, and feel confident of success.

Case 36 was that of a little Miss fourteen years of age, of a sanguine bilious temperament. Tooth, first left superior molar, anterior proximate cavity. The pulp capped as usual and the cavity filled with gold at the same sitting.

A small cavity in the grinding surface presented itself, and should have been filled at the time, but she left town for school. On her return to my office, in one year and a half from that time, the decay had progressed so far that it had caused the destruction of part of the filling alluded to, and I deemed it advisable to remove the whole. The strong septum that divided the two cavities had become so much disorganized that I was compelled to work the two into a compound cavity. In doing this I found the pulp to be in a healthy condition, but the shape of the cavity and the surrounding circumstances prevented me from capping the second time, and I exceedingly regret to say I was obliged to extirpate the pulp and fill the canals.

Case 82 was that of a lady about twenty-two years of age, of nervous bilious temperament. In this case the pulp was exposed in the left superior cuspid. It was found somewhat congested. It was wounded in excavating, and, I think, relieved by it. I medicated with simply creosote for a few days. There seemed to be slight recision of the pulp. In excavating, a small chip got into the cavity or depression, and could not by any means be removed. I thought it would cause trouble by irritation if it was not removed, and I exposed the pulp more on the distal peripheral portion and excised a portion of it and removed at the same time the particle that was retained. I then bathed again with creosote and capped with oxychloride of zinc, and filled temporarily with Hill's stopping for two months. At the expiration of that time I filled permanently with gold. As yet the pulp remains healthy, after being subjected to this treatment over seven months ago.*

This case is noted to show that, though the pulp be accidentally injured, it need not necessarily be lost.

Many other interesting cases might have been brought to your notice, but these will suffice to show some of the advantages of this method of treatment.

Gentlemen: These cases have been presented to your notice particularly, for I think they are marked cases of success and failure. During the last four years I have capped ninety-eight exposed pulps. Many of these cases have been capped under unfavorable circumstances, and yet my operations of this kind have been in a large percentage of cases successful.

Half of these cases have come under my observation months after the operation had been performed, and in many instances I have had the gratification of finding them alive and healthy over three years after they had been capped.

Of the cases seen after the operation had been performed, I consider I have only had six die. What the percentage of success will be with the other half is yet to be seen, but I have no reason to expect any worse results. What cause have I to look for a reaction after a month or a year's time? I cannot believe it. No; if bad results follow, I think they must come within a few weeks or months after the operation has been performed.

Allowing failures do occur, I think that a greater percentage of cases are satisfactory both to operator and patient when this method is pursued, than when the pulps are destroyed and the canals filled.

* I have just tested this tooth carefully, and find the pulp alive and healthy, after being capped sixteen months ago.

When we can be taught to shoot around a corner and hit the mark, we will be more successful in filling the canals of teeth; for how often do roots present themselves curved a short distance from the apex, that are impossible to fill well. If not filled to the very end, there is a receptacle left for the retention of irritating matter, that will scarcely ever fail to do duty in that direction.

These things never developed themselves fully until the tooth had been extracted. I have seen instances where teeth have been filled by careful operation, that have done tolerable good service for years, that occasioned inconvenience at times since the tooth had been treated. Upon extracting such teeth after the patient had refused to endure the annoyance any longer (though trifling, perhaps, I may say,) what developed itself? A root that was curved at such an angle that it could not be filled perfectly. No one was to blame; an unhappy misfortune both for patient and operator.

Gentlemen, these are cases that have come within the observation of us all. They are not isolated cases, and I present them as an offset to failures in capping exposed pulps. I think that there is more success with careful manipulation in capping than there is in extirpating and filling canals. No one will deny that if you are crowned with success in the former class of cases, you have done more for your patient than if you had been successful in the latter; for a tooth that performs its entire function is more useful and better able to meet the morbid influences brought to bear against it, than one that is partly devoid of vitality.

The editor of the *Dental Register* says: "It is a fact generally recognized by every dentist of much experience or close observation, that the integrity of the enamel and dentine of pulpless teeth pass away, with, however, varying degrees of rapidity, dependent upon the character of their structure, and their being modified by the original type, together with the condition and force of the organizing and developing agencies at the time of their formation."

Usually teeth deprived of their pulp become in a comparatively short time friable, which is clearly shown by the readiness and frequency with which thin portions break away. This is the difficulty that generally follows the operation of filling such teeth.

This impairment of the enamel and dentine occurs because of the deprivation of nutrient supply; and it is not only exhibited in the manner referred to, but also by the increased susceptibility of the tooth substance to the action of decay-producing agents.

The teeth vary exceedingly in the character of their structure; they

have general features and aspects that are common to all, yet there is to every one an individuality which is constituted by variation in structural details. This variation is palpable to the unaided vision in respect to form and size, but is quite as plainly marked in the minute structure under the microscope.

These variations are in the teeth, as in other structures or tissues, the occasion of ever varying susceptibilities, both in living and dead. The organization in some is so thorough, and the dentine and enamel so nearly perfect, as to resist any ordinary decay-producing agents that are brought in contact with them, and sometimes to great extent even after devitalization, while in other cases so inferior are these structures that they are scarcely able to maintain their integrity when but slightly and only for a short time exposed to the feeblest decomposing agents, even when possessed of their normal vitality ; and with such, devitalization is followed by rapid and utter dissolution.

Now there is an almost infinite variety of predisposition and susceptibilities between the extremes just presented, and the ability to apprehend and understand these conditions and susceptibilities, and in treatment to follow the indication, is an attainment of no mean order, and one that should be sought by every dentist.

The integrity of organized living tissue is maintained by the presence of vital principle, together with the process carried on by it, and, as is already intimated, the hold of vitality upon the material part of tissue is exceedingly variable ; in some holding a very firm grasp, and in others yielding its tenure at the first approach of danger. These things being true, the conclusion is forced upon us that the most acute and cultivated perception is requisite for the proper management of the teeth after they are attacked by disease.

Teeth, the pulp of which are destroyed, have no vitality, and receive no nutrition, and in common with all organized structure deprived of vitality, immediately begin to undergo deterioration, and sooner or later suffer entire dissolution.

With the teeth, however, the change may be materially modified by proper management, which consists in maintaining the most favorable condition of the parts and tissues around about them, and excluding, so far as possible, all injurious agents, and protecting the tooth at all points, so far as may be, from all mechanical violence, either in the way of strokes or undue attrition. By attentive observation and thought upon this subject, the educated dentist will not fail to perceive that pulpless teeth require the utmost care for their preservation for any considerable

length of time; that the conservation of living is far easier than those devitalized, and that the preservation of pulp of the teeth is a matter of the utmost importance to those who desire to preserve their teeth in the best condition for the longest possible period.

The dentist who endeavors to cap pulp under favorable conditions has two chances of general success to one of extirpating and filling canals; for if you are not successful by the former method you may be by the latter.

It is anything but an easy matter to remove the filling from the canals of teeth, and if you are not successful in filling to the outer extremityof these canals you will hardly ever escape periosteal inflammation or an abscess, and if you are determined to overcome the difficulty you will have to remove the filling in order to remove the exciting cause of the trouble.

Show me the man who has no abscess formed from filling roots, and I will show you one who never had a failure in capping pulps.

If, after a time, you find that the pulp is dead, you need not remove the filling to amend difficulties, for you can almost always get better access to the canals by making another cavity in direct line with the axis of the tooth, than you can to treat the case from the cavity already filled ; for I will venture to say that in one hundred cases of exposed pulps, ninety of these will be upon proximate surfaces, and this is almost always an unsatisfactory introduction to the pulp canals. If you are not successful in saving the pulp of the tooth, you have hardly ever lost anything by the method of operation, for the approach to the canal in direct line with the axis of the tooth always compensates for the lost tooth structure. If you should be so unfortunate as to have to remove the filling in the third operation, you have gained much in a point of position. We cannot expect to be crowned with success in all cases in either mode of operating. We must look at the general average, and decide for ourselves which is the best treatment in the main, and under the existing circumstances. If you attempt to cap every exposed pulp, you find those diseased as well as healthy. You will not be successful with all, and should not condemn the practice.

I believe a great deal depends upon the manner in manipulating, and the kind of material used.

There certainly is a difference in the appearance and the general characteristics of the different preparations of oxychloride of zinc used for this purpose.

My manner of using this is first to bathe the pulp with creosote. I

have used carbolic acid with good success. Then mix the oxychloride of zinc to about the consistency of cream, and with a small piece of spunk cut for the purpose, that can be nicely introduced into the cavity. I take this with plyers and dip into the prepared zinc and carry it directly to the exposed pulp and press very gently. I then take another piece of dry spunk and introduce this into the cavity, to absorb the excess of moisture in the oxychloride of zinc. Apply more oxychloride of zinc in the same manner and absorb the excess of moisture again.

By applying the preparation in this way there is scarcely any surplus of the material to be cut away. I consider only a thin layer of oxychloride necessary for success. I think that in some cases, where the whole cavity is filled with this material, bad results follow from the excess of hydro-chlorate, which has a deleterious influence upon the pulps in some conditions.

By applying a small portion and absorbing the moisture from it, it does not act as so powerful an escharotic as it would otherwise. Any application of medicine to the animal economy must be in the right proportion in order to get the happy effect. An overdose of almost anything will work mischief. Hydro-chlorate of zinc is a powerful escharotic, and we could hardly expect satisfactory results by applying an excess of the acid to such a delicate organ as the pulp of a tooth.

I believe that of all the preparations used, oxychloride of zinc is the best, for it is porous to a certain extent, and if there is an exudation from the pulp it will be taken up by the oxychloride.

I consider that creosote or carbolic acid should always be applied to the pulp before introducing the oxychloride of zinc, for by its affinity for albumen and gelatine the pulp is protected in the form of a pellicle. There is an affinity between hydro-chlorate and the elements of the pulp, but the effect is not so pleasant.

From my experience in the results of this class of cases I can scarcely see how any progressive dentist can stick to the old method exclusively of extirpating pulps and filling canals, for really everything seems to me to be in favor of making an attempt at capping and preserving these useful organs in as perfect a condition as possible.

The difference between having a tooth drawn by a professional operator, and having it knocked out by a fall on the pavement is, that one is dental and the other accidental.—*Boston Journal of Chemistry.*

THE USES OF NICKEL.

The manufacturers of the alloy known as German silver have recently submitted a petition to the Parliament of the German Empire, praying against the introduction of nickel money into that country. They state that the cost of nickel has increased at the rate of from one to three dollars, and that German silver in a single month has gone up nearly $12 per 220 pounds. In England, the price of the metal in one year and a half has risen from one to four dollars per pound.

Although but a short time has elapsed since nickel has attained any important position in the industrial arts, it is already a fact that the demand is considerably in excess of the supply. The annual production may be roughly estimated in the neighborhood of 600 tons, of which aggregate English industries alone, it is stated, use fully one-half. It is used as money in this country, Belgium and Switzerland ; and hence it is argued, with much truth, that if Germany should decide to issue a similar coinage, the necessary drain upon the supply would seriously affect the manufactures in which nickel is employed. It is very probable that abundant uses could be found for quantities far exceeding the amount now produced. In its resistance to tensile strain it is nearly one-third superior to iron, a metal which in many respects has similar features, while it is much less subject to oxidation in air or water. German silver, as is well known, is nothing more than brass to which one-sixth or one-third part nickel is added, in order to give the alloy the color of silver and at the same time a superior resistance to the action of various chemical agents. The alloy is superior to copper as a basis for silver-plated ware, as, when the deposit of silver wears away, it does not expose a red or yellow metal beneath. German silver has also been lately used as a deposit upon other substances ; an employment to which it bids fair to be largely devoted.

The increasing demand for nickel will doubtless stimulate research for new deposits ; but until such are discovered, it seems desirable that the metal should not be used for coin. Some idea of its rarity may be obtained by comparing the production as above given with the amounts of other metals. Thus, copper, for example, is mined to the extent of 65,000 tons per year, and the iron production, it is said, reaches the enormous aggregate of 10,000,000 tons in the same period. Platinum is obtained probably in smaller quantities than any metal in industrial use, only about two tons being the yearly yield throughout the entire world.—*Scientific American.*

IRREGULARITIES.

By N. W. Kingsley.

The history of the case here illustrated is very brief. The patient was a Miss twelve years of age. The second permanent molars had not erupted. The canines had erupted, but had not attained their full growth. The patient's stature was equal to the average of her age, and there was no want of symmetry to indicate a tardy or defective development of the maxillæ. The superior central incisors were a full half inch in advance of the inferiors at the mesial line. Figure 1 shows this relation.

The treatment consisted of a plate of vulcanite adapted to the roof of the mouth, as seen in Fig. 2. A hook of gold was inserted in the plate against each molar, and a little T-shaped catch was made of gold to pass between the centrals. Before introducing the plate, a rubber ring cut from tubing was secured to one of the hooks at the back of the plate, passed through a loop made in the stem of the T, and caught upon the hook on the opposite side. The plate was then adjusted to the roof of the mouth, and the T brought forward ; its stem, being quite thin, was passed between the centrals, and the cross-bar caught on their labial surfaces, as shown in Fig. 2. This was the only treatment the case received, and in seven weeks the result was, as is shown in Fig. 3.

The incisor teeth were brought back in contact with those of the inferior jaw, and the contrast in the form of the dental arch is strikingly shown on comparison of Figs. 2 and 3.

At the end of the period above stated, a simple retaining plate was introduced, resting against the palatal surfaces of the incisors, which were held in firm contact with it by a slight rubber ligature. This retaining plate was worn a number of months, after which it was abandoned, and the teeth remained stationary in their newly acquired position. A natural inquiry follows as to what became of the lower teeth during this process.

The answer is, that the bicuspids and molars both articulated well with their antagonists before the treatment, and this articulation was not interfered with so rapidly, nor so extensively, but that the lower teeth ultimately followed into a new position by mere force of occlusion, and by the time the retaining plate was abandoned, both dental arches had assumed a new and permanent shape.

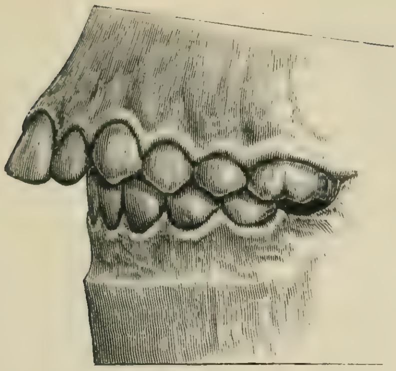


Fig. 1.

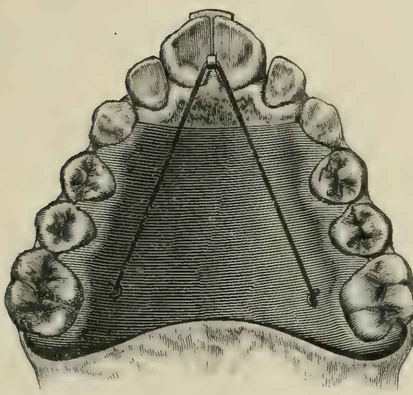


Fig. 2.

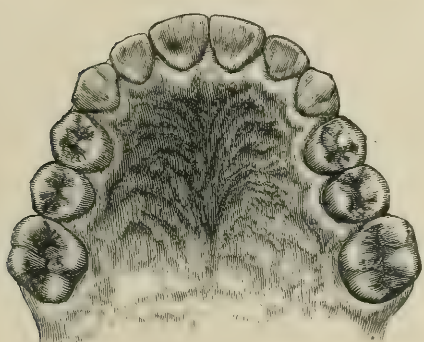


Fig. 3.

The above case illustrates how great a work can be accomplished by a very simple means, and yet this kind of an appliance might not be of any benefit in any other case except one exactly like the above. This case would very naturally be termed one of a "V-shaped maxilla;" but it was not a V-shaped maxilla. I doubt very much if the maxillæ were concerned at all in the disturbance. I came to this conclusion before commencing treatment, but even if I had not, I think the sequel proved that it was a deformity entirely independent of the maxillæ, and confined to the alveolar and dental arches.

It was a V-shaped, or triangular dental arch—an arch in which the sides from the base to the centre were not curved as they should be, but nearly on a straight line. I believe, therefore, that the apices of the roots were in the maxillæ upon their normal curved line; the crowns of the incisors thrown beyond the line, and the side teeth drawn within it. Had it been otherwise I do not believe that force alone, on the centre, like pressure made on the keystone of an arch, would have produced the desired bulging at the sides.

An essential element, however, of the treatment, was the plate across the roof, which effectually prevented any tendency for the arch to collapse while the pressure was exerted.

The term "V-shaped maxilla" is very likely to be misapplied, and is an unfortunate term in any case. In those writings where it has attracted the most attention, it does not seem to be a "V"-shaped maxilla which was under discussion, but rather a saddle-shaped palatine arch—one in which the sides of the dental arch presented an appearance of having been pinched together, and in which the triangular form of the V was not applicable to either the dental arch, the palatine arch, or to the maxillæ.

This criticism is made because the case under discussion would be classed by many under that general term, and its origin most likely referable to the same cause.

As to its cause, I have no knowledge sufficient to prove its hereditary character. I do not believe it to have been the result of "thumb-sucking" nor "fruitless sucking" of any kind. It was not associated with "enlarged tonsils," nor did the patient habitually keep the mouth open for breathing, and thus (as it has been claimed) have the sides of the arch unduly pressed upon.

Mr. Tomes has advanced the latter hypothesis for similar cases, but it does not offer to my mind a sufficient explanation, as I should regard the retracting power of the orbicularis and all the other muscles

merging in it, as equal in their influence over the positions of the teeth, to those muscles acting more posteriorly. With a contracting muscular power distributed all around the circumference of the dental arch, I cannot see how, as the result of that power, the arch should sink in at its sides and bulge forward.

The "causes," I am inclined to think, will be found less mechanical, and more developmental.

OXYGEN GAS AS A REMEDY IN DISEASE.

From New York Medical Journal.

By Andrew H. Smith, M.D.,

Member of the Academy of Natural Sciences, Philadelphia; Corresponding Member of the Gesellschaft fur Heilkunde, Berlin; late Assistant Surgeon and Brevet Major U. S. Army, etc.

CHAPTER III.

PHYSIOLOGICAL ACTION OF OXYGEN.

In regard to the physiological action of oxygen, the first question to be determined is, whether it is possible to cause the blood to take up more oxygen than it receives from the atmospheric air; whether the point of saturation is not attained in ordinary respiration. On this point there was formerly but one opinion. It was thought that there was practically no limit to the power of the blood to absorb oxygen. This idea was no doubt in part based upon the known energy of combustion in pure oxygen gas, and the supposed identity of that process with the retrograde metamorphosis of animal tissue. It was held that the inhalation of pure oxygen would induce rapid chemical action within the body, that a state of general inflammation would ensue, and that destructive metamorphosis would be so much more active than the process of reconstruction that the vital machinery would soon be spoiled, and rendered incapable of continuing its action.

But after a time it was observed that these extreme results did not actually take place—that an animal could remain for a number of hours in pure oxygen without sustaining any apparent injury. This led certain observers to the conclusion that the blood-corpuscle became saturated with oxygen when common air was breathed, and that it would take up no more, no matter how much was presented to it in the air-cells of the lungs. This view was defended by Regnault and Reiset, who endeavored to sustain it by the following experiment: They con-

fined animals in oxygen, and after a time examined the gas, and found that it contained no more carbonic acid than would have been exhaled in the same time if the animals had respired atmospheric air. That these experiments were not conclusive, will become apparent as we proceed.

On the other hand, we cited the fact that animals die in a period varying from three to eighteen hours if confined in an atmosphere of oxygen, and that the tissues present an unusually florid aspect, approaching to a vermilion hue. These observations I believe to be no more conclusive than the others. On this point Demarquay says: "Science had already taught, what our experiments have confirmed, that animals can live without danger in an atmosphere of pure oxygen, and for a much longer time than in the same volume of air. But beyond a certain limit these animals at last succumb, and one may then satisfy himself that the medium in which they have respired is still capable of relighting an ignited body—a very evident proof that death has taken place from the oxygen itself, and not from any alteration which it may have undergone from admixture with the carbonic acid exhaled." *

As the test referred to above—that of relighting an extinguished taper, the extremity of the wick being still red hot—is constantly relied upon to prove the respirability of the gas after such experiments, it is well to state at the outset that it is entirely worthless. This is shown by the following experiment:

Experiment I. —Two parts of pure oxygen were mixed with one part of carbonic acid, prepared by the action of sulphuric acid upon marble. A pint jar was filled with the mixture, which sufficed to relight a taper four times.

Demarquay himself states that ten per cent. of carbonic acid, mixed with oxygen, is sufficient to render the latter incapable of sustaining life,† yet we find, by this experiment, that the test which he relies upon would indicate its respirability when containing thirty-three per cent.

The apparatus employed by Demarquay in his experiments, which are essentially similar to those of his predecessors, consisted of a large cylinder furnished with two openings, through one of which the animal was introduced, while to the other a tube was fitted connected with a reservoir of oxygen. The animal, having been placed in the cylinder, a large quantity of oxygen was introduced by the tube, the amount being

* Essai de Pneumatologie Medicale, p. 644.

† Ibid., p. 442.

sufficient to drive out the air in the apparatus, which escaped by the other opening. When it was judged that the cylinder was filled with pure or nearly pure oxygen, both apertures were closed. The animals experimented upon were common fowls, pigeons, and rabbits.

The result of these experiments was that, when the animals were allowed to remain in the apparatus for the space of an hour and three-quarters, and were then killed, nearly all the tissues of the body were found reddened to a greater or less extent, but the venous blood retained its darker hue. Two rabbits were allowed to remain until death took place, which, in one instance, was at the end of fourteen hours, and in the other after seventeen hours. At the close of each experiment the gas was found to relight a taper.

These experiments coincide in their results with one of my own, in which the conditions were similar:

EXPERIMENT II.—*June* 10, 1860.—A rat was confined in a jar containing about a gallon of pure oxygen, and inverted over water. At the end of two and a half hours death took place. On opening the body all the internal organs were found to be of a bright-red color.

It will be observed that, in both these instances, no provision was made for removing the carbonic acid and other products of respiration, and that the gas must have become excessively impure. In the following experiments this omission was corrected:

EXPERIMENTS III., IV., and V.—*July* 15, 1869.—A pigeon and two mice were confined respectively three, four, and five hours in jars of oxygen, having a strong solution of caustic potash in the bottom, under a stage upon which the animal rested. The jar was so arranged at the same time that a small stream of oxygen from a rubber bag was constantly flowing into it, and escaping by an aperture of like size. The solution of potash absorbed the carbonic acid, while the gradual change of the atmosphere within the jar was sufficient to prevent a sensible accumulation of other impurities.

These animals, when killed, did not present any appreciable change in the appearance of the tissues.

EXPERIMENT VI.—*August* 25, 1869.—At 3 P. M., a pigeon was placed in a jar of oxygen, of the capacity of three hundred cubic inches, and the jar inverted over a solution of potash. The following morning the animal was found dead. Upward of one hundred and fifty cubic inches of oxygen had been converted into carbonic acid, and absorbed by the potash, the liquid rising in proportion in the jar. On opening the body *no unusual redness of the tissues was observable.* The feathers of the bird,

and also the sides of the jar, were wet with the condensed moisture of the breath. The animal was also in a constrained and uncomfortable position, which, doubtless, hastened its death.

The conclusion which I draw from these experiments is, that the lively red color of the lungs, heart, liver, etc., which are described, and which I have myself seen, does not depend upon hyperoxygenation alone, but also upon a coincident retention of carbonic acid in the tissues. The color pervades the intervascular substance as perfectly as the natural coloring-matter pervades the muscular fibre. It cannot, therefore, be ascribed to simple increase of vascularity.

The following experiments show that, in Demarquay's observations, the oxygen is as little chargeable with the death of the animals as with the change in the color of their tissues :

Experiment VII.—*August* 13, 1869.—A mouse was confined in a jar of oxygen inverted over a solution of caustic potash. At the end of twenty-five and a half hours, during which he had neither food nor drink, he was dull and stupid, but, when released, ate greedily, and was soon as lively as ever.

Experiment VIII.—*August* 16, 1869.—A tin box, seven by ten inches, and six inches deep, open at the bottom, and having the top of glass, was placed in a shallow vessel containing a solution of potash. A little above the surface of the solution was arranged a false bottom of wire-cloth, which formed the floor of the apparatus. A circular opening on one side of the box was fitted with a projecting rim soldered to its edge. To this rim or collar a cap was fitted, and the joint was made air-tight by an india-rubber band stretched around it. This opening was for the purpose of introducing the animal to be experimented upon. A tube passing into the box was connected with a large reservoir of oxygen. By means of a stop-cock the amount of gas passing into the apparatus was so regulated that a bubble would escape every second or two from under the edge of the box. Within the box was placed an open vessel containing chloride of calcium to absorb the moisture from the breath, and another vessel with dilute nitric acid to take up the ammonia exhaled. Food, water, and a quantity of tow for a bed, having been provided, a mouse was introduced into the apparatus, and the aperture closed air-tight. Oxygen was then admitted freely for some time until all the air was expelled, when the stop-cock was closed to the point already indicated. The animal ate, drank, and arranged his bed, and acted in every particular as mice generally do, until the third day, when he buried himself in the tow, and seemed very

quiet. By this time his excretions gave to the gas, which escaped from the apparatus, a very sickening smell.

At the end of four days the mouse was removed and transferred to a cage, where he recovered at once his accustomed liveliness, and appeared no worse for his unique experience.

This single experiment is sufficient to overthrow the theory of hyper-oxygenation of the blood, as the term is generally understood, and to show that the fatal results heretofore observed, as well as the peculiar *post-mortem* appearances, were the result of the admixture of the products of respiration with the gas inhaled.

Are we, then, to accept the conclusion of Regnault and Reiset, that inhaling pure oxygen makes no difference with respiration? Clinical observation and facts derived from experiments teach us clearly to the contrary.

The quantity of oxygen in the blood under normal conditions is extremely variable. This follows from the varying exigencies of the system. The transition from perfect repose to active exertion implies increased molecular action and increased consumption of oxygen. The blood-corpuscles are the carriers of oxygen, and, as their number remains the same, each one must assume a greater burden. To explain all the phenomena resulting from the inhalation of oxygen, it is not necessary to assume the absorption of more than corresponds with the extreme limit of this healthy respiratory demand. All the analogies of Nature lead us to suppose that this limit coincides with the point of complete saturation of the blood. To assume a margin beyond it is to suppose a provision against an emergency which can never arise. It is contrary to the economy of Nature that the blood should have the capacity for absorbing more oxygen than Nature can supply.

My view is, then, that if pure oxygen be taken into the lungs, only as much will be absorbed by the blood as would be taken up from the air under circumstances involving the greatest possible physiological demand for oxygen. I know that it has been asserted that blood agitated in a vessel with oxygen will assume a livelier red than when agitated with common air. This, however, is a mistake. The change will take place more promptly with oxygen, but the hue will be in the end the same. We may therefore assume that, if the blood and the air be brought into sufficiently intimate contact in the lungs, the corpuscles will become saturated with oxygen from the ordinary atmosphere.

Experiment IX.—*August* 20, 1869.—A quantity of defibrinated

sheep's blood was divided into two portions. One portion was thoroughly agitated with oxygen, and quickly assumed a bright-red hue. The other was agitated in the same way with common air. The change took place more gradually, but eventually, when the two jars were placed side by side, no difference in the color could be distinguished.

The portion agitated with air was then placed in a vessel filled with oxygen, which was closed tightly, while its interior was made to communicate with a delicate manometer. After the lapse of an hour, during which the vessel was frequently agitated, no change had taken place in the height of the fluid in the instrument, thus indicating that no additional oxygen had been absorbed.

How, then, is this appearance of superoxygenation of the blood to be accounted for, since it never occurs when atmospheric air is respired? The conditions which obtain while breathing oxygen, without removing the products of respiration, are entirely *sui generis.* They differ from those observed when air is substituted, in that the proportion of carbonic acid may become much greater without destroying life. They differ, also, from the effect produced by confining an animal in a mixture of carbonic acid and oxygen, since in the latter case the change is abrupt, while in the former it is very gradual. The experiments of Count Morrozo, and of Bernard, show what an immense difference, in the effect upon the animal, results from this circumstance. I offer the suggestion, therefore, that the red stain of the tissues is the result of the prolonged action of carbonic acid retained in the blood—life, meanwhile, being kept up and the activity of retrograde metamorphosis sustained by a *maximum absorption of oxygen.*

When a considerable quantity of pure oxygen is inhaled, there is usually a sensation of freedom about the chest, as if respiration were easier. Some persons describe a feeling of warmth beneath the sternum, such as results from inhaling a slightly-stimulating vapor. Sometimes a slight degree of vertigo is produced. Generally there is a tendency of the blood to the surface, and the hands and feet, if previously cold, become warm. In some cases this change of the circulation is accompanied by a pricking sensation. The pulse is sometimes accelerated, but more frequently remains unchanged. In cases of debility it is often reduced in frequency. The temperature is but little changed, if at all. I have sometimes observed a disposition to yawn constantly during the inhalation, and there is generally an inclination afterward to sleep. All these effects are more marked when the gas is inhaled fasting.

Small quantities of oxygen inhaled daily, frequently have the effect of stimulating the appetite to a remarkable degree. This fact is attested by numerous observers, and has often come under my observation. That the increased amount of food is assimilated is shown by a corresponding gain in weight.

In reference to the effect of the inhalation of oxygen upon the amount of carbonic acid formed, and of urea excreted, there has been as yet but little research. The experiments of Regnault and Reiset, upon the first point, have been already referred to. The subject, however, is beset with difficulties, and much caution is required in accepting the results of experiments as to the amount of carbonic acid exhaled when breathing a greater or less proportion of oxygen. Different results will be obtained at different times when breathing the same medium under apparently the same conditions as to diet, stage of digestion, exercise, etc. The slightest bodily exertion, or even mental excitement, will vitiate the experiment. In experiments with animals, eructations of gas from the stomach will sometimes add largely to the percentage of carbonic acid obtained.

My experiments on this point have brought out an (to me) unexpected result, viz., that the inhalation of a considerable quantity of oxygen is followed within a few moments by a temporary *decrease* in the amount of carbonic acid exhaled, as is shown in the following table. The experiments were made upon myself:

	Hour.	Cubic Inches of Oxygen inhaled.	CO exhaled per minute.
EXPERIMENT XI., July 29, 1869.	4.35 P.M.		21 c. in.
	4.45	600	
	5		19
	5.18		20
EXPERIMENT XII., August 3d.	3.25		22
	4	400	
	4.10		16
EXPERIMENT XIII., August 5th.	12.15		19
	12.25	700	
	12.30		16½
	12.45		18
EXPERIMENT XIV., August 5th.	2		19½
	2.50	400	
	2.55		19½
EXPERIMENT XV., August 5th.	2.55		19½
	3.15	1200	
	3.35		17½
EXPERIMENT XVI., August 12th.	6 A. M. (fasting)		18
	6.15	500	
	6.40		17
	7		17½

EXPERIMENT XVII.—*August* 4, 1869.—A pigeon was placed in a jar containing three hundred cubic inches of oxygen, and the jar inverted

over a solution of caustic potash. After twenty minutes the oxygen was removed and replaced by common air. In thirty minutes the volume of air had decreased thirteen cubic inches. The following day the same pigeon was confined again in the same quantity of air for the same period, not having previously inhaled oxygen. The decrease amounted to eighteen cubic inches. There was no evidence that the health of the animal had been injured by the previous experiment.

The manner in which oxygen produces this effect is not easily explained. It is possible that its immediate action may be like that of alcohol, which is known to cause a diminution of the carbonic acid exhaled from the lungs. This is the more probable from the similarity of its other effects, when well marked, to those which alcohol produces.

Notwithstanding this temporary decrease of carbonic acid, I am of the opinion that the ultimate effect of oxygen is to cause its increase. The increase is probably small, and it would doubtless be extremely difficult to demonstrate it conclusively, under normal conditions of activity. Still it seems to me that the result of the following experiments could hardly be attributed to mere accident :

EXPERIMENT XVIII.—*August* 12 *to* 24, 1869.—Three observations were taken daily, of the amount of carbonic acid exhaled by myself. In all, twenty observations were made in seven days, nearly every hour of the day being represented. The average of these observations gave 17.2 cubic inches per minute. During the four following days, eleven similar observations were made—the conditions remaining the same, except that from six to ten gallons of oxygen were inhaled each day in divided doses. The average of these gave 18.9 cubic inches, as the amount of carbonic acid exhaled per minute.

These results, while they coincide with the generally-received opinion as to increased activity in the retrograde metamorphosis as resulting from the use of oxygen, show nevertheless that the increase is confined within narrow limits, and thus confirm the view already expressed, that saturation of the blood-corpuscles with oxygen is quickly attained, is a *strictly physiological condition*, and in no way necessitates the setting up of any morbid action within the system.

To test the effect of oxygen upon the amount of *urea* excreted, I made the following experiment :

EXPERIMENT XIX.—*December* 8 *to* 22, 1869.—The urine for each twenty-four hours was carefully preserved, and the amount of urea estimated according to Haughton's second formula. The result is given in the following table :

DATE.	GALLONS OF OXYGEN INHALED.	UREA IN GRAINS.
December 8	.	641
" 9	8	624
" 10	8	561
" 11	10	472
" 12	6	472
" 13	6	590
" 14	12	550
" 15	14	552
" 16	18	510
" 17	..	542
" 18	..	601
" 19	..	546
" 20	.	556
" 21	..	495

This table shows a rapid decrease in the amount of urea, during the first four days after beginning the inhalations of oxygen. It then increased again, but did not attain to the former figure. With the cessation of the oxygen there is again an increase. The average of the days without oxygen is 563 grains, of those with oxygen 541 grains.

So far as these experiments go, they indicate that oxygen causes a *decrease* in the amount of urea formed. This is surprising, if we are to consider urea as the result of *oxidation* of tissue, as is generally held. More extended observation is required before it would be warrantable to call in question the views so ably enunciated upon this point; but, should it be established that the continued use of oxygen really diminishes the excretion of urea, it would place the latter substance in analogy with the smoke resulting from combustion—a product, it is true, of combustion, but at the same time a measure of the incompleteness of the process.

The quantity of uric acid in the urine is rapidly diminished by the daily use of oxygen. This fact, suspected by Dr. Golden (*Lancet*, March 10, 1866), has been fully established by Kollmann, of Munich.

In the course of the experiments described above, I observed a very striking diminution of the coloring matter of the urine At the commencement of the experiment the urine was very high-colored, but within twenty-four hours it became very pale, and remained so for several days after the oxygen was discontinued. This paleness was not owing to an excess of water, as the specific gravity never fell below 1.022, and was usually above 1.025.

(*Continued in No. 5.*)

NOTE ON CHLOROFORM.

By P. H. Hayes, M.D.

Chloroform never did any harm on the field of battle. In two hundred thousand cases where it was employed in the war of the Crimea, not a single instance of harm could be traced to its use, while the surgical records of our own battle-fields of the rebellion fully sustain the experience of the Crimea. The conclusion is, that it is always safe to use chloroform for pain actually *present*. The writer has given it many times to parturient women, beginning as the pains became severe, and continuing its use till delivery; from two hours to five or more in different cases, and with only the happiest results—the saving of my patient from pain, and the *memory* of pain, and from constitutional irritation and exhaustion.

Equally happy results have followed its use in puerperal convulsions, and the teacher of obstetrics in the University of New York tells his class he has in these cases given it sixteen hours, and that a recurring convulsion is far more likely to kill, than the chloroform. In a case in my own practice, of semi-tetanic convulsions from the extraction of a very sensitive tooth in a weak woman, it acted like a perfect charm after other means had failed, and I continued its use at intervals as required, for a half day.

In all these illustrations, *pain*, *spasms*, *constitutional irritation*, one or more *exist*, when the chloroform is given, and constitute the indication for its use, which the surgeon can measure by his judgment on the instant.

But when chloroform is given, as it more commonly is, to *prevent* pain in an operation not yet begun, great care is required: first, because there is no pain present on the instant to antidote its poisoning and paralyzing power, and second, the patient often comes to the operation under the spell of *fear*, either of the operation or the chloroform, or both, and this fear is itself a *shock* to the nervous system, and the heart is already half paralyzed from this cause only, and thumping with palpitation. Such a patient may be already literally half dead, and what wonder that, when the shock of chloroformization is superadded, death should ensue?

The opinion of the Boston jury in the case of Mrs. Crie sounds more like an admonition than a scientific conclusion. What would this same jury say as to the case of Mrs. Homan, of Lynn, against whom the scale was turned by ether, just as apparently as against Mrs. Crie by chloroform?

AN UNEXPECTED PROPERTY OF ADHESIVE GOLD.

By Thos. Fletcher, Esq., F.C.S., England.

Read before the Odontological Society of New York, March 17th, by Dr. T. B. Hitchcock, of Boston.

I desire to submit to the Society, as briefly as possible, a matter to which my attention has been called by Mr. Thomas Fletcher, of Warrington, England.

That its effect, if proven, will be to modify the present methods of filling teeth, there seems to be no doubt. It may be the mallet is to be put aside, and the many who claim the credit of first using it, may be outnumbered by those who will say, "I *always* said that fillings of cohesive gold were not reliable."

We have all, as we supposed, been inserting fillings which are far superior to those made by the older operators who so persistently refused to adopt the modern "improved" methods. But I fear we are to be convinced to the contrary; I confess I have been "much more surprised than pleased by the result" of several tests which I have made, and I think, if you will repeat them, you will also be surprised.

In his letter Mr. Fletcher submits several propositions, all of which I was at first ready to dispute, but at present I am unwillingly obliged to admit the correctness of some of them, though, as others have not been confirmed by my own experiments, I feel a little doubtful in relation to them. But we will have the subject as presented by Mr. Fletcher himself; first, an article from the *British Journal of Dental Science* for February, then extracts from his letter, which I received March 3d. After which I will submit for your examination several fillings made in different ways, and with various preparations of gold which have been subjected to the tests.

"Having slowly come to the conclusion that adhesive foil, sponge, gold, &c., although easy to work, do not give in all cases thoroughly permanent results, I endeavored to find a satisfactory reason why one peculiar character of gold, apparently so good, should with me prove in practice distinctly worse than the old fashioned foil with little or no adhesiveness.

Amongst other experiments I applied my own tube test to different samples of gold, and the results were so strange and unexpected that I repeated them time after time with the greatest care before I could

convince myself that the results were always the same and were not caused by carelessness or oversight in any way.

Taking a strong glass tube, quarter inch bore, three quarters inch long, I partially closed one end with the blow-pipe, and in the small hole left, carefully anchored an adhesive gold plug, building it up with the greatest possible care, using in some cases a Snow and Lewis mallet, and in others hand pressure only. After making repeated trials with adhesive foil, sponge, plastic gold, annealed cylinders, and blocks, using every care, I failed totally in making one single plug tight against moisture. Pack as I would, the filling up the vacant part of the tube with a colored solution was speedily followed by the penetration of the fluid by capillary action between the glass and the plug.

When I used soft, non-adhesive gold or tin foil there was no difficulty, and every plug was absolutely tight. The plugs of adhesive gold were apparently a perfect fit, showing no imperfections under a powerful magnifying glass, but the unpleasant fact still remained, that not one was tight enough to resist the passage of moisture down its sides, spite of attempts to wedge the plugs by the use of conical points. Whilst testing some samples of amalgam recently, I was surprised to see some plugs, which were very perfect in my hands a few minutes before, had become suddenly very faulty. After some experiments I found that the heat of my hands had in a few minutes caused sufficient expansion of the glass to allow the colored solution to pass between the glass and the plug, and that a large plug in a very smooth glass tube could be made quite loose by the heat of the hand alone.

It is possible that the alternate expansion and contraction of a rigid mass of adhesive gold or amalgam may have something considerable to do with its ultimate failure where the plug is large and much exposed to contact with food at different temperatures. This cause of failure would not be likely to exist with non-adhesive foil, wedged in position, as it always will retain a certain amount of elasticity.

The question raised as to adhesive foil and sponge gold by these experiments is one of such importance that it should not be allowed to rest on the conclusions of any one operator, as the manner of working varies so greatly, and it also remains to be seen whether the process of testing in glass tubes is one which will in all cases bear out the practical results in the mouth. The reason glass was chosen is that faults may so readily be seen, and the packing can be carried on in a much more perfect manner, whilst the plug and the point of the instrument can be watched closely.

Since writing the above, I have attempted to make water-tight plugs of adhesive foil and sponge gold in cavities in ivory with exactly the same results, and still not being satisfied I gave the result of my experience to two of the best operators I know. The reply in each case was, 'Oh, I will make a tight plug for you.' The remark being accompanied with a 'superior' smile which I fully appreciated. Neither of these tight plugs have come to hand as yet, and it is pretty evident that the failure of adhesive gold in my hands is not an exceptional case. I have now tried some seven or eight different forms of adhesive gold with the same results invariably, and have failed with a foil after annealing, which made a sound and tight plug before. When soft and adhesive gold are used alternately, the fluid penetrates to the adhesive part only, being unable to pentrate past a layer of soft foil unless carelessly inserted.

I forgot to mention that the plugs in ivory were examined by being sawn through, after being covered with solution for a time and afterwards dried."

EXTRACTS FROM LETTER.

"DEAR DOCTOR:—Will you read the following, and carefully repeat my experiments; and if you find I am right, get a fair and open inquiry into the matter? How it has passed notice so long I do not know. * * * Take a good hard tooth with a nice cavity—the easiest you can find if you like, put it in a vise, and do your very best at filling it with either sponge or properly adhesive foil. When your plug is finished, drop the whole into blue or violet ink for three or four days, and I will undertake that the cavity shall be colored strongly to the very bottom, when dried and split open. To detail all my experiments would require much time, but I state the following points, which admit of distinct proof by any operator, viz.:

1. A moisture-tight plug is not in all cases a necessity for the preservation of teeth.

2. Not one-tenth of the plugs of the best operators are really moisture-proof, unless picked cases are taken, which consist of the most simple cavities filled with *soft* gold or tin foil.

3. A moisture-proof metal plug can *only* be made in the mouth, (I exclude theoretical tests in tubes, ivory, &c.,) by soft gold or tin foil in simple cavities, and by an amalgam which has a distinct *expansion* in difficult cavities.

4. Amalgam free from shrinkage will make moisture-tight plugs only under favorable circumstances.

5. A really moisture-tight plug is an *absolute protection* to any and every cavity in *every mouth*, and a filling once made sound, is safe as regards further decay forever under all possible conditions.

I expect you will open your eyes at this letter, but a few experiments will prove to you that I am right, that the highly ornamental fillings we see are not all the operators would like, if they only knew the state of things underneath. I am inclined to believe that the failure of any *one* filling after any number of years, is only to be looked upon as a strong reprimand to the operator, either for carelessness or the use of improper materials. * * * In the meantime I should like to know if I have been able to alter your original opinions on fillings in general, and whether you agree as to the practical value of my tests as a judgment on filling materials."

NEW DENTAL HOSPITAL—LONDON.

London, March 3d, 1874.

Yesterday was a great day for Dentistry in this country. The doors of the New Dental Hospital were thrown open to the public for the first time, and the scene in Leicester Square last night was one to gratify all who take an interest in Dentistry.

Perhaps it is not generally understood that for many years the Odontological Society has rented rooms from the Dental Hospital. Now, although the interests of the two institutions are not quite identical, yet they are so nearly alike as to enable them to work together with mutual advantage. The Society and Hospital are worked by the same staff of servants, and having an interest in both institutions, they look after the property of the Society during its recess, and in the intervals between the meetings. The members have the satisfaction of knowing that their Museum and Library are not rusting away in idleness, but are fulfilling to the utmost the object of their existence. The school connected with the hospital has the advantage of the use of the Museum. The students can study in it daily, and the lecturers can draw upon its resources for objects with which to illustrate their lectures. The library is also, under certain restrictions, open to the students of the school. In this way there is much mutual benefit ; for, what would otherwise be two Museums and two Libraries, becomes one of each, and consequently so much more complete and convenient. The Hospital, too, has a tenant in the Society, which pays it a good rent, and exacts the

minimum of trouble and expense. This arrangement has long been in existence in Soho Square, and is now continued in the new premises in Leicester Square, which were opened last night by the March Meeting of the Odontological Society. The Hospital is to commence operations on the 12th, when the friends of the institution will dine together in the evening, to wish the Hospital success by drinking its health, and making pretty speeches, and when everybody will no doubt praise every other body, and in so doing, manage to cover themselves with glory in the usual after-dinner fashion.

The first meeting of the Odontological Society in its new quarters, was made the occasion for a conversazione, and, although the rooms were not cleared of rubbish till the eleventh hour, the show made last night was most gratifying.

The new President, Mr. Sercombe, had been indefatigable in his attention to everything that could be attended to, and as a consequence, he had the satisfaction of delivering his introductory address to the largest audience that ever met under the auspices of the Society. The meeting was a very short one ; one or two casual communications which will be duly reported in the transactions and in the independent journals, then the address from the President, and the adjournment of the meeting.

On the arrival of the guests they were conducted through the waiting-room to the cloak-room. In the waiting-room was arranged a handsome buffett, beautifully decorated with flowers, and plentifully supplied with articles of various kinds, both eatable and drinkable. I do not know if the ladies who carry on the whiskey war would have objected, but there was a plentiful supply of wine for those who liked it, and for those who preferred other drinks there was tea, coffe, sherbet, etc.

In the rooms above, the Museum was displayed to considerable advantage, only a few specimens belonging to one of the contributors having been withdrawn from it before its removal from Soho Square, but several fresh donations had more than replaced the gap thus created. The curator, Mr. C. Tomes, had been ceaseless in his labors to get everything straight, and certainly earned all the credit he received. He had, besides, arranged a series of preparations under a number of microscopes, showing the progressive development of the teeth and other interesting histological objects.

If a certain gentleman could have seen the various specimens in the Museum and the microscopic array just alluded to, he might have thought that burring engines, operating chairs and mineral teeth were

not the only things in which to excel, in order to "lead the world in Dentistry."

There were exhibited several molds for making obturators on Dr. Kingsley's recent plan. The perfection and simplicity of the obturators themselves excited much admiration. Sir William Ferguson and Campbell DeMorgan both showed the liveliest interest, and spent some considerable time examining them.

In one corner of the museum was suspended a wooden tablet presented by Mr. Brand, of Exeter. It measured nineteen inches by nine, and was found behind the paneling of an old oak room in Ottery St. Mary's Devon. I have made a tolerable fac-simile of it. You will see that most of the letters are quite modern in style, although the arrangement is crude in the extreme. I think after this that you must admit some advance in sign-boards, if not in Dentistry, in this old benighted land.

Thos: Smith GLazier

Let BLood & Draw

att 3d

Teeth ∧ Tea KitteLs & Potts

BuckeLS & Lantrens Cups

To Be HandeLd Heare

There were in all over two hundred visitors present. There was plenty to look at and plenty to talk about, and everybody went away pleased, except one gentleman who had lost his hat, but on being advised to appropriate a couple which were too small for him, with a suggestion that two small ones should make up for a big one, he became reconciled to his loss.

As I did not lose my hat, I mean to send it around among my friends and try to raise six dollars to buy a ticket for the dinner on the 12th; and if anything worthy of note transpires you shall have a letter forthwith—that is, if you wish it. If I get more than enough to buy the dinner ticket I shall devote the surplus to a fund for subscribing to your new journal and to the Philadelphia one.

Your obedient servant,

VAGRANT.

DENTAL MALFORMATIONS.

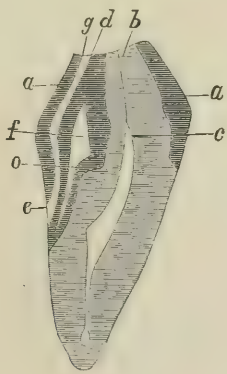
By Robert Baume.

[DEUTSCHE VIERTELJAHRSSCHRIFT.]

I.—A Tooth in a Tooth.

Through the kindness of Mr. Wehner, of Frankfort, I am indebted for a preparation which, of its kind, is unique. For this reason I am about to give an exact description of this object, partly according to the diagnosis of Mr. Wehner.

The case under consideration is a small incisor of the upper jaw, which was developed in the canine tooth on the right side. The patient, a man of about thirty-five to forty years of age, was without the upper lateral incisors, which had never appeared. The other teeth were unusually fully developed, as is shown by the accompanying illustration of the canine tooth referred to, which shows a section longitudinally, double the natural size. The canine tooth was, in consequence of severe inflammation of the periosteum, extremely loose and very painful, so that extraction was decided upon. There was no trace of caries to be seen.



The tooth referred to was, notwithstanding its unusual size, normal in form, and easily to be recognized as a canine tooth. On account of its extraordinary size and curious appearance, the tooth was divided longitudinally for the purpose of especial examination, and at the first glance, the astonishing appearance was observed of the missing incisor of that side having been developed within its neighbor, the canine.

The relative positions, which in the accompanying figure are correctly

shown (double the natural size), may be described in the following manner: First of all we see at the point *a* the well-developed enamel layer of the outer tooth (canine), at *b* the dentine, and at *c* the full but compressed crown pulp pushed sideways, placed behind the incisor, which is also lingual. In the enclosed incisor may be observed at *d* a comparatively thick enamel layer, which apparently encloses the whole crown of the tooth. The layer of enamel at the point *o* is in many folds. From the enamel layer of the crown portion a fine canal may be traced, *e*, which is mostly covered with a thin layer of enamel obliquely through the fang of the canine tooth, and finishing on the labial side about the middle of this fang. After the layer of enamel of this incisor may be observed a cavity of quite disproportionate size—the pulp cavity, *f*; the dentine layer between the enamel, *d*, and the pulp cavity, *f*, is entirely wanting, which was later quite evident upon microscopic examination. As we have previously mentioned, a hollow way, covered finely with enamel, proceeds from the encased incisor, and finishes on the outer surface of the fang. There arises, accordingly, apparently a direct communication between the pulp of the enclosed tooth and the vessels of the periosteum of the canine tooth.

On close examination of the incisor, the want of dentine and the disproportionably large cavity which must represent the pulp cavity, are very striking. Besides which, this cavity was filled with a dried substance, which was recognized under the microscope as gangrenous pulp.

As may be seen from the drawing, the neck and fang-portion of the enclosed incisor was entirely wanting, and is only represented by the thin canal covered with enamel, which runs through the fang of the canine.

The connection of the two, blended together in such an extraordinary manner, is very close, and cannot in any way be separated. We might, for example, make a section enclosing the enamel of the canine tooth and the incisor together, with the dentine, *g*, lying between *o*, without one of these parts becoming separated.

Especially interesting is the microscopical examination of this malformation. The outer tooth, beyond its unusual form, offers little out of the common; the strange arrangement of the dentinal canals being the most striking. The latter do not run regularly from all sides to the pulp (which, as we have stated, is pushed behind the enclosed incisor), but have suffered a considerable deviation, as they are apparently pushed by the incisor out of their course.

So run, for example, the canals with a thin layer of dentine at *g*, not

in a horizontal direction from one enamel to the other (*a*—*d*) as might be supposed, but in a vertical direction. In the incisor they appear also to run round. That is the only anomaly which is found in the tooth, an anomaly which is characteristic in the development and origin of this malformation.

The relations of the small enclosed incisor are quite different. The considerably thick layer of enamel is rather irregularly developed. Already, when seen with the naked eye, it is observed that we have nothing to do with well-developed normal enamel. This is established by microscopical observation, which shows the enamel is broken through by manifold hollow spaces.

It would be expected that next to the enamel, dentine would be found. Notwithstanding the most careful examination, there is in this tooth not a trace of dentine to be found; on the contrary, the enamel layer at the side next the pulp cavity is here and there (creeky). The little inlets have the appearance of Howship's lacunæ.

Where is the dentine of the enclosed incisor? We naturally wish to establish this circumstance. There is not the slightest trace of this substance to be seen in the sections under the microscope, which were taken from half of this anomalous tooth.

From this I conclude that if dentine is present in the tooth it is in the slightest degree. Perhaps the dentine has never been developed? Did it not become calcareous here? If dentine was really developed, where is it? These questions naturally occur; the answer is more difficult.

Had dentine been present in the many sections taken from various parts of the preparation, its traces must have been discovered. Unfortunately I must acknowledge that at present I cannot decide whether the dentine was not developed, or whether it was lost later by resorption by the pulp, which was certainly present. That a tooth can be formed without dentine is, as far as we know at present, impossible. How, then, can the enamel have become developed? The view, then, that here especially no dentine was formed, falls apparently to the ground.

The other view, namely, that the dentine was later destroyed by the pulp, has much greater probability. First of all, we know that it not unfrequently occurs that the exuberant pulp resorbs considerable portions of dentine, although we have no case where the whole of the dentine has been missed from the crown. The view that the dentine was removed by supplementary resorption is strengthened by finding small

inlets of the character of Howship's lacunæ on the inner side of the enamel layer. A process of resorption has therefore doubtless taken place. Therefore the supposition that the whole dentine of the enclosed incisor has been resorbed by the pulp, has the greater appearance of probability.

The origin of the malformation in question may be explained much more easily. There can hardly arise a doubt that the enclosure of one tooth germ (the incisor) in another (canine) is the answer to the question. The correctness of this assumption occurs at the first moment, and is shown by the curious diversion of the dentinal canals of the canine tooth, as has been already described. The time when the development of this malformation took place must be dated as far back as fœtal life.

Especially remarkable in this case is the appearance of this malformation on both sides of the upper jaw, as on the left side a similar canine tooth is seen, while the incisor fails. In all probability, then, the same abnormality occurs on the left side of the upper jaw. Whether the conditions are precisely similar to those we have described, we must wait to see till we can get possession of this canine tooth also, for the purpose of especial examination.—*London Monthly Review of Dental Surgery.*

A NOVEL METHOD OF EXTRACTING DECIDUOUS TEETH.

Among the many useful little articles which it is always convenient to have at hand in a dental office, is small rubber tubing, in sizes from an eighth to a fourth of an inch. The uses to which it is adapted, viz :—as a means of separating teeth, holding the rubber dam on the molars or other teeth when central cavities are to be filled ; as a dam, in connection with the napkin or bibulous paper when the Barnum dam is not at hand. In correcting irregularities of the dental arch its use in various ways has suggested itself to the intelligent dentist. For this purpose it is an indispensable article with us ; in fact, we feel that we might say, without fear of successful contradiction, that any irregularity of the arch, no matter how great, can be corrected by a proper use and application of these little rubber rings and the silk ligature. But we have now to record a new use for this useful little article, namely, the extraction of the deciduous teeth. Some of our readers may perhaps

know from sad experience the effect of leaving a rubber ring for a day or two surrounding the neck of a tooth. If it was an incisor or canine, you had the mortification of seeing your patient return with a very sore tooth which was gradually being drawn from its socket. We have had a little experience of this kind, and it has taught us useful lessons. We have learned from it never to leave, for a moment, a rubber ring on a tooth which we did not desire to extract, without having a ligature passed through it to remind us of its presence. And again, if we desired to extract a deciduous molar for a timid child, the rubber ring furnished the most convenient and ready means of doing it without pain, and to the great surprise and gratification of our little patient. All we found to be necessary in the case was to slip one of these rings over the tooth, force it gently under the gum and dismiss our patient with the injunction not to remove it. The tooth would gradually loosen and finally fall out, the rubber ring having surely, silently and painlessly done the work of the dreaded forceps. E.

[*Missouri Dental Journal*

DENTISTRY IN JAPAN.

The Japanese are a very industrious and ingenious people, and while in many respects they resemble the Chinese, there are marked points of difference in the habits and manners of the two nations. There is a stamp of originality in the productions of the former as distinctive and peculiar to them as can be seen in the two peoples of the Anglo-Saxon race, designated as English and American. The Japanese mechanic is generally well skilled in his employment, and his work is characterized by that nice perception of style and finish which indicates the true artist. It is pains-taking work, but it is performed with all the enthusiasm and devotion so noticeable in the inhabitants of the Orient. Whole families work together at the same trade in the domestic quiet of their own homes, and in this way they transmit a kind of inherited skill to the children, which is cleverly displayed by even the youngest members of the houshold who are large enough to be acquainted with the use of tools.

Factory life is almost unknown in Japan, and there are few large establishments of this description, the exceptions being witnessed in a number of important silk factories, porcelain works, and cabinet workshops.

Dentistry is a famous "trade" in Japan, and as metal enters into the manufacture of the Japanese false teeth, we will close our notice with an account of their manufacture. It is well known that, although the Japanese possess fine teeth, they dye them black, and whether from this custom or from the use of wooden brushes, they lose them very early in life. To us it seems that their tooth-brushes should receive most of the blame, as they consist of tough wood pounded at one end to loosen the fibres. They resemble paint-brushes, and owing to their shape it is impossible to get one behind the teeth. As might be expected, there is an accumulation of tartar which frequently draws the teeth. The process of manufacturing false teeth is very crude. The plates are made of wood, and the teeth consist of tacks driven up from under the side. A piece of wax is heated and pressed into the roof of the mouth. It is then taken out and hardened by putting it into cold water. Another piece of heated wax is applied to the impression, and after being pressed into shape, is hardened. A piece of wood is then roughly cut into the desired form, and the model, having been smeared with red paint, is applied to it. Where they touch each other a mark is left by the paint. This is cut away until they touch evenly all over. Shark's teeth, bits of ivory or stone, for teeth, are set into the wood and retained in position by being strung on a thread, which is secured on each end by a peg driven into the hole where the thread makes its exit from the base. Iron or copper tacks are driven into the ridge to serve for masticating purposes, the unequal wear of the wood and metal keeping up the desired roughness. Their full sets answer admirably for the mastication of food, but, as they do not improve the looks, they are worn but little for ornament. The ordinary service of a set of teeth is about five years, but they frequently last much longer. All full upper sets are retained by atmospheric pressure. This principle is coeval with the art. In Japan dentistry exists only as a mechanical trade, and the status of those who practice it is not very high. It is, in fact, graded with carpenters—their word *hadyikfson* meaning "tooth-carpenter."—*Iron Age.*

PRIZE ESSAYS.

We go to press too early in March to enable us to announce in this issue the award of the committee to the writer of the best essay on Rubber Dam and its Uses. Our May number, we may hope, will con-

tain both the notice of the decision of the committee and publication of the successful essay. The competing essays are now in the hands of the Prize Committee. On the 10th inst., as stated in our last number, the essays on Burring Engines and their Uses will be given to the judges for examination and award of prize. Drs. A. H. Brockway, W. Jarvie, and C. P. Crandell have kindly consented to act as a Prize Committee for examination of these essays.

When they make their award we will announce the result in the Miscellany, and ship a Morrison Chair to the successful contestant.

In our first offer of Prizes we did not give writers sufficient time for the preparation of essays. Some of the articles were fully two weeks on the way to us, having come from Europe. Of course the Miscellany, with its announcement of our offer, did not reach these writers in a shorter time after its publication. They could not get their articles here in time for competition for the prize first offered, and had but a very few days at their command in which to prepare essays for the second competition. In fact, none except those residing in the immediate vicinity of New York had sufficient time in which to write. For this reason we think it best to make the interval of time between the offer on our part, and the time of handing in articles to the Prize Essay Committee, somewhat longer. Instead of announcing a subject for the next contest, we decide to leave the choice with the writers individually, only stipulating that the essays be written upon some subject of practical interest to dentists.

First.—We will therefore offer a Surgeon's Case Complete, No. 1, (Nitrous Oxide Apparatus), as a prize to the writer of the best essay on any subject of practical interest to dentists.

Second.—We offer a Morrison Dental Bracket as a prize to the writer of that essay which the Prize Committee shall pronounce the second in merit of those submitted in accordance with the above offer.

These essays are to be handed to the Prize Committee June 30th, 1874, and should be sent us in conformity with all the conditions of our offer in the article on Prize Essays in Miscellany, page 37, No. 1. Instead of the words Rubber Dam Essay, or Burring Engine Essay, to be written at the left hand lower corner of the outside envelope, as there requested, write simply, Prize Essay No. 3.

The essays should be sent in as soon as possible; but, to be successful, cannot reach us later than the 30th of June.—Pubs.

INFLUENCE OF THE TEETH ON DISEASES OF THE TONGUE.

By T. Francis Ken Underwood, Esq.

In the discussion which followed upon Mr. Fairlie Clarke's able paper on the "Influence of the Teeth on Diseases of the Tongue," read before the Odontological Society, Mr. Mummery alluded to a case which came under his care, of epithelioma of the tongue treated by extirpation, and he remarked on the fairly plain speech of the patient three months after the operation. Erichsen mentions (as Mr. Fairlie Clarke stated in answer to this remark) that in the middle ages it was not at all an unusual thing for those who had suffered mutilation of this organ to speak as plainly as they did before this cruel sentence was carried out. A large number of cases in which this occurred is described in Mr. Clarke's book on the tongue, and amongst other things it is noticed that in Persia (where, as late as the year 1857, this punishment was practiced) the belief among the unfortunate victims is, that merely the removal of the tip of the organ will completely take away the power of speech, while extirpation of the whole does not seriously interfere with that all-important faculty, and they accordingly consider it a great favor if the executioner will cut away the *whole* instead of the tip only of their tongues. Sir Benjamin Brodie (quoted in the same work) says that "the *modification* of the voice forming articulate speech is effected especially by the motions of the soft palate, the tongue and the lips, and partly by the cheeks and teeth. The mutilation of any *one* of these organs will affect the speech so far as that organ is concerned and no farther, the effect being to render the speech more or less imperfect, but not to destroy it altogether. There are three things necessary to speech: first, the knowledge of words; secondly, the knowledge of how to articulate; thirdly, that the external organs should be in a healthy state. With the first condition the tongue is not concerned; with the second and third it certainly is, but the question now is to what extent? What part does the tongue play in the faculty of rendering speech intelligible, and how far is it actually *necessary* to articulate speech? From all that has been said and written upon the subject it certainly bears a very subordinate part, being mainly concerned in the pronunciation of the two consonants "d" and "t," for the proper pronunciation of which it is necessary that the tip of the tongue should touch the roof of the palate. If this be so this organ has for many ages, and by universal consent, been abused for faults and misdemeanors for which it was not answerable.

[*British Journal of Dental Science.*

NOTES.

Hospital Report.

Report of dental cases treated at the Massachusetts General Hospital, Dental School of Harvard University, from October 1st, 1873, to February 10th, 1874. Winter term.

OPERATIVE DEPARTMENT.

Whole number of patients treated				3,260
Teeth extracted				1.158
"	filled with	gold	686	
"	" "	amalgam	198	
"	" "	Hill's stop'ng	176	
"	" "	Oxych. zinc	225	
Total number fillings inserted				1,285
Miscellaneous operations				1.218
Total number of operations				3.661

MECHANICAL DEPARTMENT.

19	Teeth mounted on	4	gold plates.
67	" " "	10	silver "
383	" " "	37	vulcanite plates
469		51	

5 Repair Cases.

2 Kingsley's artificial palates.

2 Suerson obturators for cleft palate.

1 Interdental splint for fracture inferior maxilla.

C. WILSON, D.M.D.,

Dentist to the Mass. Gen. Hospital.

Morrison Engine Patents.

Referring to an article in a Western Journal on the above subject, we explain:

1st. We have examined carefully the claim of the owners of this sheep-shearing patent, and know that it is an imposition.

2d. If any dentist is attacked by a suit at law to compel him to pay money for the use of the Morrison engine, we request him to refuse to pay anything, and to turn over the case to us for control and defense. Not a dollar can be collected.

3d. Even if the claims were proven, the damages would be insignificant—only for *the use* of the engine from (the time of the reissue of their patent) to the present time.

4th. The new and improved engine is entirely free from their claim.

5th. The whole trouble comes from a dentist who bought up an old and valueless patent for a sheep-shearing apparatus, and reissued it in the hope of compelling fellow members of his profession to pay him a royalty. That is, Dr. Morrison having devised and with great industry produced a really valuable invention, he essays, by revamping an old and inefficient sheep-shearing patent, to reap the fruits of another's ability.

Our counsel says it can't be done.

JOHNSTON BROTHERS.

Obituary.

At a special meeting of the Brooklyn Dental Society, convened February 28th, 1874, resolutions of condolence were passed upon the death of Dr. Charles F. Mermier, of Brooklyn, a worthy member of the Society, who died February 26th, 1874, aged forty-five years.

C. P. CRANDELL,

Recording Sec'y B. D. Society.

Baltimore College of Dental Surgery.

The Thirty-fourth Annual Commencement of the Baltimore College of Dental Surgery was held at Concordia Opera House, on Thursday evening, February 26th 1874, in the presence of a very large audience. The spacious hall was crowded to such a degree that many were obliged to stand during the entire exercises. The music was furnished by Professor Minnick's orchestra.

The exercises commenced with prayer by the Rev. E. R. Eschbach, after which Professor F. J. S. Gorgas, Dean of the Faculty, in announcing the names of the graduates, and the authority by which the degrees were conferred, stated that since the organization of the Baltimore College of Dental Surgery, thirty-five years ago, nearly *eight hundred* graduates have received the degree of Doctor of Dental Surgery, and *twelve hundred* students have attended the lectures of the institution; this College being the first, and for many years the only dental college in the world.

The degree of "Doctor of Dental Surgery" was then conferred by Professor Gorgas upon the following graduates:

John Abner Chapple,
Lewis Mileston Cowardin,
Thomas H. Davy,
Henry Clay Devilbiss,
Alfred Eubank,
John W. Farmer, M. D.,
Homer Kenyon Green,
Louise Jacobi,
George Vernon Jenkins,
Douglas Malcolm,
Charles Augustus Mercer,
J. Henry Morgan,
James Bruce Moseley,
David N. Rust,
Thomas L. Sydnor,
Thomas Ritchie Vermillion,
Charles Ferdinand Wagner, M.D.,
William B. Wise,
Silas Robert Wyse.

After the degrees were conferred, the Valedictory Address was delivered by Professor Henry R. Noel, M.D., of the Faculty. The subject of this address was "The Mystery of Life," showing its relation and dependence upon the animal kingdom, and was an interesting and scientific production.

The Class Address was delivered by John W. Farmer, M.D., of Virginia, and was appreciated by his class-mates and the Faculty of the College for its excellence.

The following changes have occurred in the Faculty of the Baltimore College of Dental Surgery since the last annual commencement. Professor M. J. DeRosset having resigned the chair of Chemistry, on account of his removal to Wilmington, N. C., Professor W. P. Tonry was appointed Lecturer on Chemistry for the session just ended—a position which he filled to the satisfaction of both Faculty and Students. Professor P. H. Austen having recovered from his recent illness, will fill the chair of Dental Science and Chemistry. Dr. James B. Hodgkin, of Alexandria, Va., was elected Professor of Mechanical Dentistry in October last.

During the coming spring and summer the College Building will be greatly enlarged by the addition of an adjoining building under a new common front, which will add to the size of both Lecture Rooms, Infirmary and Dissecting Room, and present an appearance not inferior to any institution of the kind in this country.

The *Thirty-fifth* Annual Session will commence on the 15th of October, 1874, and continue until March, 1875.

The Infirmary of the College is open during the entire year.

History of American Dentistry and Dental Surgery.

We print the following numerously signed expression of disapprobation, at the earnest solicitation of numerous friends. We have also resolutions sent us expressing the same sentiment; one passed at the monthly meeting of the "Boston Society for Dental Improvement," held March 10th; another by the "Alumni Association of Pennsylvania College."

Whereas, It has been proposed by the "Atlantic Publishing Co." to publish a "History of American Dentistry and Dental Surgery," comprising biographical sketches of American dentists:

We, the undersigned, desire to express our disapprobation of the same, for the following reasons, *viz*:

Instead of exalting our specialty, it will weaken its position in the minds of educated members of the community; it will compromise us in the estimation of professional gentlemen, and subject us to just criticism for indulging in a species of self adulation and personal advertisement, and offer the opportunity for men whose professional attainments are inferior, to gain notoriety at the expense of those more deserving.

While we have no objection to a well executed history of dental surgery, confined to no country and including its whole development, we cannot but look with disfavor upon a book so fruitful of the above evils.

Finally we hope to protect our profession from such charlatanry.

Louis Jack,	Philadelphia.
C. N. Pierce,	"
George T. Barker,	"
S. Dillingham,	"
Thos. C. Stillwagen,	"
David Roberts,	"
I. S. Fogg,	"
J. Lehman Eisenbrey,	"
E. L. Hewitt,	Philadelphia.
S. S. Nones,	"
W. H. Trueman,	"
G. R. H. McDonnell,	"
E. T. Webb,	"
E. Wildman,	"
T. L. Buckingham,	"
Wilbur F. Litch,	"
Charles J. Essig,	"
William C. Head,	"
Elihu R. Pettit,	"
F. M. Dixon,	"
J. H. McQuillen,	"
M. Kirk,	"
James Truman,	"
C. A. Kingsbury,	"
Alonzo Boice,	"
E. H. Neall,	"
M. H. Webb,	"
Robert Huey,	"
W. T. H. Bonwill,	"
W. H. Atkinson,	New York.
O. A. Jarvis,	"
F. N. Seabury,	Providence, R. I.
Charles E. Francis,	New York.
William Carr,	"
W. A. Bronson,	"
Benjamin Lord,	"
E. A. Bogue,	"
A. L. Northrop,	"
R. M. Gage,	"
A. C. Hawes,	"
S. G. Perry,	"
William H. Allen,	"
John T. Metcalf,	"
Charles D. Cook,	Brooklyn.
O. E. Hill,	"
H. G. Mirick,	"
C. A. Marvin,	"
Albert H. Brockway,	"
Thos. H. Chandler,	Boston.
Thos. B. Hitchcock,	"
E. G. Leach,	"
E. Blake,	"
S. F. Ham,	"
T. O. Loveland,	"
J. T. Codman,	"

THE

Morrison Dental Chair.

Price, $150.00. Boxing, $5.00. Spittoon Attachment, $8.00.

It possesses great superiority over any chair before offered to the profession, and is at the same time less expensive than any other first-class chair. Some of its points of superiority we here enumerate :

1st. All the advantages of any low-based chair, and also of any high-based chair, are here secured in a single chair. In it the patient can be placed lower than in the lowest-based chair made, or higher than in any other of which we have knowledge. At its lowest position the seat is fifteen inches, and at its highest position forty-two inches above the floor.

2d. The operator using the Morrison Chair can either stand or sit at his work, as he may choose, working with equal convenience in either position.

3d. It has been a very general complaint that dental chairs are too wide at the back, so holding the operator away from his work. Here this difficulty is overcome. The chair is narrow at the back, so that the operator need not stretch to reach the patient, but *can lower either arm of the chair out of the way* and so be as near the patient as he may choose.

4th. It can be changed from its lowest to its highest position in seven seconds—a celerity impossible in any chair raised by a screw.

5th. It can be very readily and perfectly adapted to operations on children of any age

First. Because in it the child can be raised as high as needed for the tallest operator.

Second. It provides a comfortable back and head rest, exactly as for grown persons.

Third. The footstool can be lengthened or shortened, to suit children of any size.

6th. The back of the chair can be lengthened or shortened rapidly and at will.

7th. The lower part of the back can be thrown forward to support the small of the patient's back.

8th. The chair, when adjusted to any position, is firm or steady wherever placed, and this is *especially true of the head-rest.*

9th. It occupies less room than any other operating chair.

10th. Although the footstool, when at its extreme length, is much longer than any other made, yet a person of ordinary weight can stand on its extremity without tipping the chair.

Nota Bene.—We have substituted brass cogs and castings, for those that experience has shown in any degree faulty, and the chair, *as now sold, is as strong as any chair made.* Reference is made to this because several of the chairs first sent out, failed in the cogs by which the chair is raised, and in the castings which throw the lower back-pad forward. These have been replaced in every instance with brass cogs, without charge on our part, and to the complete satisfaction of the purchaser.

We are gratified in being able to refer to the commendations, which follow, from some of the leading practitioners of the country.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

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10 W. 11*th St., New York, July* 24*th,* 1873.

MESSRS. JOHNSTON BROS., Broadway:

I find your Morrison Chair gives great satisfaction. My patients all admire, and voluntarily pronounce it the easiest they ever sat in. The movable back-piece, arms and foot-rest, which latter the patients can adjust at pleasure without changing their position, the lowering of the whole chair, which admits stepping into it without the slightest inconvenience, are points which call forth immediate praise from the patients, and give great satisfaction to the operator.

As a child's chair it is invaluable; the little patients can be "put just where you want them," while the operator can with ease change the position of the *whole* chair, without disturbing the patient in the least. These points, combined with others which it has, make this chair the most desirable of any which I have seen. Very respectfully yours, A. L. NORTHROP.

JOHNSTON BROS., *Hartford, June,* 15*th,* 1873.

GENTLEMEN: I have used the new Morrison Chair several hours every day since its arrival here, and feel in duty bound to say that there is no chair manufactured that can compare with it.

Its adaptability to children as well as adults, support for the small of the back—in fact, all its motions are perfect, and I see no chance for improvement. Dr. Morrison and yourselves have my heartfelt thanks for the great benefits you have conferred upon the profession in perfecting the chair as well as the Dental Engine. Very truly yours, GEO. L. PARMELE, M.D., D.M.D.

MESSRS. JOHNSTON BROS., *Hartford, July* 24*th,* 1873.

DEAR SIRS: The Morrison Chair meets all my expectations. I like it very much; in fact, I feel perfectly satisfied that I have one of the most complete chairs yet made for the comfort of patients and the convenience of the operator.

Yours truly, JAS. McMANUS.

IMPROVED
Morrison Dental Engine.

The cut on the following page well illustrates the new Engine, and, with the subjoined description, will make the alterations plain to all. While still disappointed in being unable to fill orders for them, we are so nearly ready that no considerable further delay in filling orders can ensue. We are doing all that can be done consistent with thorough workmanship to hasten the manufacture of both this and the Suspension, or Elliott Dental Engine.

DESCRIPTION.

1st. The rocking movement of the upright standard is abandoned, and a rigid, handsomely plated, and tapering column substituted.

2d. From the top of this column extends an arm directly in front of the patient. This arm swivels upon the column, and is adjustable vertically, being secured by a brace at any height desired, thus bringing its end directly in front of the patient's mouth, whatever be the height of the operating chair.

3d. Attached to the end of the adjustable arm by a most ingenious universal joint, is a shaft about twelve inches long (corresponding to the extension arm of the old engine), which carries at its end the handpiece.

- *a*. This shaft, being short, is much lighter than the old one, enabling the operator more perfectly to feel his work, and is also less liable to tremor.
- *b*. Both sides of the mouth may be reached without changing the position of the engine.
- *c*. By lowering or raising the adjustable arm, according as the operation is upon the superior or inferior teeth, the driving spring is but slightly flexed, and great steadiness secured.

4th. The off-centre spring is attached above the driving wheel, partially supporting it and reducing the friction.

5th. The handpiece is much smaller, and the burs so secured that they may revolve in either direction, and at the same time be used either with a pushing or pulling cut, and this without the use of a catch spring. Old style burs can be refitted to this handpiece.

6th. An improved "right angle," capable of doing duty at several other angles, will be illustrated in our May issue.

The model engine of this pattern, as above described, has been for several weeks in use in the hands of one of the best operators in our city, and is pronounced by him a very decided improvement.

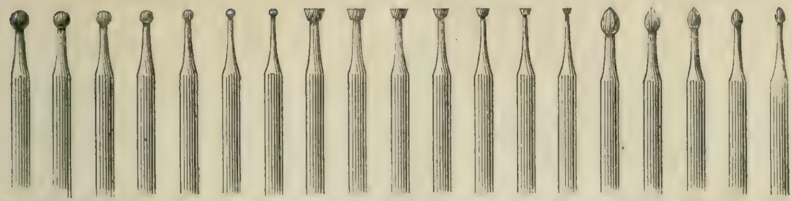
JOHNSTON BROS.

IMPROVED MORRISON ENGINE.

Price, $60. Attachment Extra.

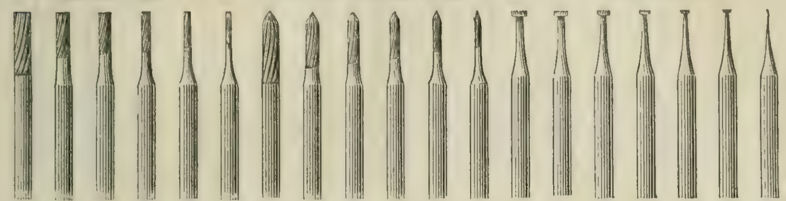
CAVITY INSTRUMENTS.

ROUND. INVERTED CONE. BUD SHAPED.



100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118

FISSURE BURS. POINTED FISSURE BURS. WHEEL BURS.



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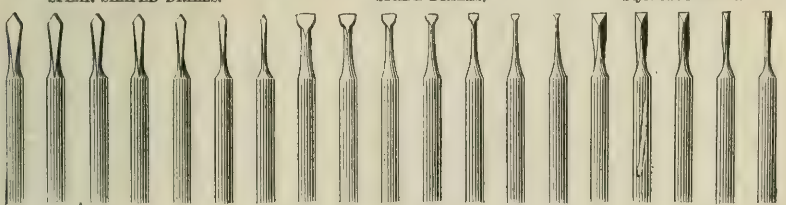
SPEAR SHAPED DRILLS. SPADE DRILLS. SQUARE DRILLS.



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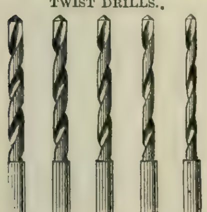
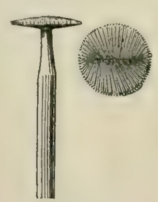
TWIST DRILLS.



219 220 221 222 223



Price, $1.25.

CAVITY INSTRUMENTS FOR RIGHT ANGLE ATTACHMENT.

We have in stock, and can furnish *Cavity Instruments* for the *Right Angle Attachment*, of all styles and sizes, from Nos. 100 to 218, inclusive.

SCOTCH STONES, MOUNTED.

The Scotch Stones enable the operator to give a finish to fillings hitherto unattainable, and only need a trial to be appreciated. We have these in stock of forms Nos. 75, 77, 80 and round. Other kinds of stones are now in process of manufacture.

HINDOOSTAN STONES, MOUNTED.

Forms of Nos. 75, 77, 80, and round. Of each shape we make three sizes. The cuts referred to by the numbers represent the large size. These are, beyond doubt, of the greatest utility in cutting either gold or bone. They last longer than any other stone.

LEATHERS, MOUNTED.

We have in stock Leather Points mounted on Mandrils, of forms Nos. 75, 77, 80 and round, designed to be charged with powders, for polishing and finishing fillings.

Screw Mandril, to be armed with leather, wood, etc., for polishing fillings, cleaning teeth, finishing plates, etc.

PRICES.

Finishing Burs,	Per dozen,	$6 00
Stoned Finishing Burs,	Each,	1 00
Cavity Instruments and Screw Mandril,	Per dozen,	3 00
Stoned Cavity Burs,	Each,	50
Right Angle Cavity Instruments,	Per dozen,	3 00
Leathers, Mounted,	"	3 00
Hindoostan Stones, Mounted,	"	6 00
Scotch Stones, Mounted,	"	3 60
Burnishers,	"	9 00
"	Each,	0 75
Corundum Points, Mounted,	Per dozen,	1 50
" " not Mounted,	"	0 75
Bands for Engine,	"	1 50
Twist Drills	Each,	40

IN ORDERING INSTRUMENTS DESIGNATE THEM BY THEIR NUMBERS, AND STATE WHETHER THEY ARE WANTED TO FIT THE OLD OR NEW STYLE HAND PIECE.

Especial attention is called to our burnishers. They have been most cordially endorsed by our most prominent operators.

Purchasers of the new style improved hand piece will have all of their old stock of burs fitted to the new hand piece, free of charge, by sending them to us either by mail or express.

☞ Our instruments are all made of the best Stubs' steel. We shall spare no effort to make them equal in every respect to anything offered to the profession.

☞ We are constantly adding new forms and sizes of Plug Finishing Burs, Cavity Instruments, Drills, etc.

DIRECTIONS FOR USING THE ENGINE.

1. In lifting the engine, be sure *not to bend* the arm which carries the hand piece.

2. Whenever the least noise is heard, oil the engine with the best sperm oil. The rapidity of motion renders oil a necessity.

3. The only part at all likely to break, is the small spring, which conveys power at the upper end of the hand piece. It is not soldered to the shaft, but is slipped on by hand. To put on a new spring, take hold of it near the end opposite that you apply to the shaft, and twist as if to *uncoil* the spring, at the same time pushing the spring on to the shaft. You will be greatly aided in removing the broken parts, by twisting, as if to uncoil, the spring. A piece of emory paper will be found convenient to aid in holding the polished shaft.

4. The engine, to run satisfactorily, should be oiled daily; and the driving-spring should be perfectly straight.

IMPROVED INSTRUMENTS.

WE HAVE ADDED to our list three new and very popular sizes of Cavity Burs. One round called 106½, one inverted cone called 113½, one wheel-shaped called 137½. Each is smaller than any before made by us, of its shape. These numbers are neatly put up in dozen and half dozen packages, and are completely protected from oxidation and from rubbing against each other in transportation.

They are very popular, and we frequently receive orders from dentists for from one to three dozen of each.

STONED BURS FOR BURRING ENGINES.—For some time past, we have made to order, a Bur for use in Burring Engines, by the following process: The teeth of the Bur being laid out with extreme accuracy, are filed to *exactly the same length*, but are not brought to a cutting edge. The Bur is now tempered, and each tooth *afterwards stoned to a fine edge.* This secures a Bur perfect in all its cutting edges, and unequaled by anything hitherto offered in the market. Of these we are provided with a limited supply, of both Cavity and Finishing Burs, excepting Fissure *Burs.* (See Price List.)

THIN BOXWOOD DISCS for carrying Polishing Powder, to polish fillings in proximal cavities. These are of four sizes, from ⅜ inch to 1 inch diameter.

WE ADD THAT THE INSTRUMENT-STAND, elsewhere illustrated, will be found very useful for the convenient keeping of the Engine Instruments while not in actual use.

Besides the form represented in the cut, we have them with smaller holes, and very many more of them, so that each Bur may be kept by itself.

WE INVITE the fullest examination of our Engine Instruments, as regards

The quality of the steel from which they are made.

The shape and finish of the cutting edge.

Their temper.

The rapidity with which they cut.

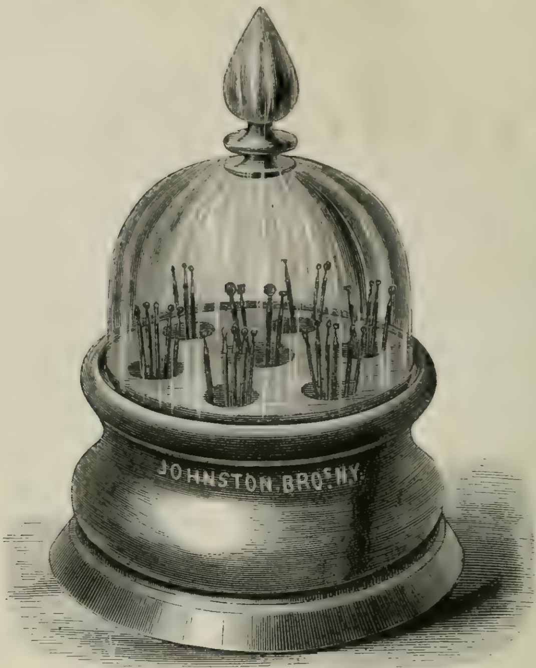
Their durability.

The shaft of each instrument is *round and highly finished,* and can therefore be used without unreasonable and unnecessary injury to the nose of the handpiece, which injury occasions unsteadiness in all the uses of the Engine.

They will *bear* examination in *quality* and *price.*

JOHNSTON BROS.

INSTRUMENT STAND FOR ENGINE BURS.



Price, $2.50.

No. 1 as above. No. 2 with many more, but smaller holes.

This is made of rosewood and maple in alternate layers, and is very ornamental. Besides the form shown above, we have another like this in all respects except that the holes into which the burs are placed are made so small as to hold only one or two instruments in each. We call this No. 2.

JOHNSTON BROS.

CARVACROL. C.^{20} H.^{14} O.^{2}

HIGHLY RECOMMENDED.

PROPERTIES:—Locally applied, Carvacrol, in full strength or diluted, seems to possess antiseptic, disinfectant, sedative, mildly caustic and escharotic, gently styptic, stimulant, irritant and rubefacient properties.

Carvacrol, as a substitute for Glycerole of Thymol and Creosote or Carbolic Acid, in cases of Odontalgia, Sensitive Dentine, Alveolar Abscess, "Canker Patches," etc., may be locally employed in the same manner.

As a gargle for Tonsillitis and inflamed mucous membranes, it may be employed in the proportion of about three drops to the ounce of water, or the strength can be increased when more powerful action is required.

Price per Bottle, $1.00.

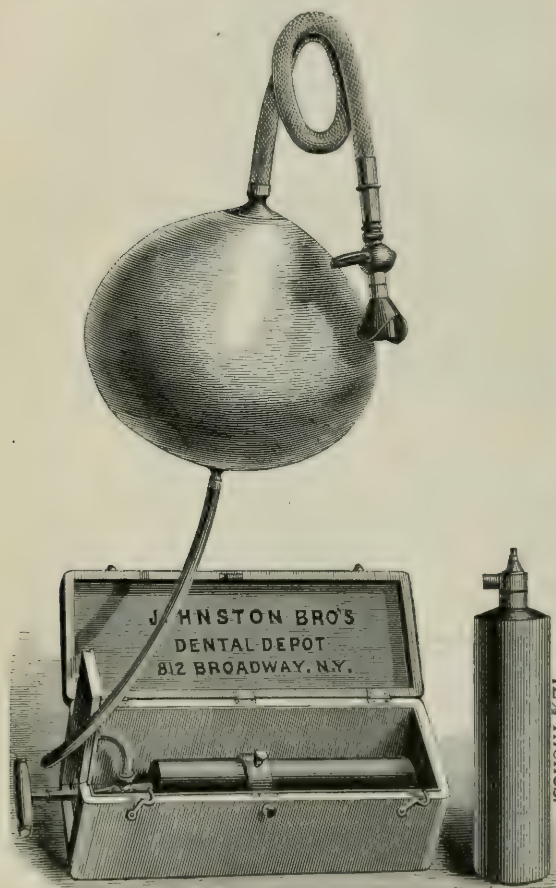
H. L. SAGE, D.D.S.

For Sale by JOHNSTON BROS.

LIQUID NITROUS OXIDE.

[Revised Circular.]

The increased and still increasing demand for Pure Liquid Nitrous Oxide, and for information concerning apparatus for its exhibition, renders it necessary that we issue yet another edition of our circular upon that subject. As the Surgeon's Case, as first introduced, has proved itself in every way all that we could wish it to be for the place assigned to it, we cannot do better than to repeat here our first description of it.



SURGEON'S CASE.

This comprises a strong cylinder containing One Hundred Gallons of Gas; a strong morocco covered case, provided with an iron ring and set screw, by which the iron cylinder is held in place during use, and its delicate valve protected from injury; also, a rubber bag with rubber tube at one end for admission of gas, while an inhaling tube, handsomely covered on its outside, and provided against any possibility of a collapse by a tin-coated spiral of wire on its inside, is fastened at its opposite end—an inhaler—a nickel-plated wrench and a nickel-plated key. In fact, *all* the apparatus necessary for administering the gas. The whole case and contents weighs about fifteen pounds. This is here shown as open, and the bag which receives the gas from the cylinder, and from which it is exhibited to the patient, is represented as filled, and suspended above the case. The cylinder is also shown as standing at the side of the case. This is the simplest and most popular form of apparatus, and will be everywhere welcomed—because of its portability for use outside of the operating room.

The first letters of recommendation we published are of so cheerful and enthusiastic a character, that we cannot feel satisfied to lay them aside. We, however, add a few of more recent date. The more we examine the statistics of anæsthetics, the more thoroughly are we convinced that whether we would suit the real interest of either surgeon, dentist or patient, no other anæsthetic should be used.

One single argument in favor of Chloroform and Ether over Nitrous Oxide can be adduced—they are cheaper.

Per Contra—examine the evidence below.

From a careful examination of the statistics of 200,893 cases, Prof. E. Andrews gives, in the *Chicago Medical Examiner*, the following estimate of the relative danger from different anæsthetics:

Sulphuric Ether	1 death to	23,204	administrations.
Chloroform	1 "	2,723	"
Mixed Chloroform and Ether	1 "	5,588	"
Bi-chloride of Methylene	1 "	7,000	"
NITROUS OXIDE	**no Deaths in**	**75,000**	"

[*Dental Cosmos.*

Edward R. Squibb, M.D., than whom our country has no more able pharmaceutist and toxicologist, in a lecture on anæsthetics before the Medical Society of the State of New York, says: "Nitrous Oxide was the first anæsthetic; and the safety and certainty of its effects, even in inexperienced hands, for all momentary operations, and the promptness with which persons recover from its use, render it perhaps the most important of all anæsthetics, because destined to relieve a greater aggregate amount of pain, *with greater safety,* than any other agent."

Again—"If the surgeon considers the safety and saving of pain to his patient first, and his own convenience in operating, second, he will hesitate before passing over such an agent as Nitrous Oxide."

It may be well just here to call attention to the fact that, when ether or chloroform is administered, it is not at all uncommon for the air about the patient to become so charged with the vapor as to somewhat affect the surgeon, taking from him perfect clearness of mental operation, and of the senses, and frequently leaving him with headache, and even nausea.

When Nitrous Oxide is given, nothing of this occurs, and the surgeon is in no way conscious of the presence of the anæsthetic, except as he sees its effects on his patient. This, we think, is a convenience to the surgeon.

Numerous and repeated trials of the Liquid Nitrous Oxide in capital operations in surgery, (as well as in momentary operations), during the two years just passed, attest the perfect adaptability of this agent to all cases where an anæsthetic is needed, and the time will not be very distant when it must supplant the use of its cheaper, but dangerous rivals.

Why Nitrous Oxide should be preferred to Ether or Chloroform.

1*st.* It is far safer—see statistics above. Dr. Colton reports having administered it to thousands of patients, without a single accident.

2*d.* It acts quickly; from one to two minutes being generally sufficient to bring a person completely under its influence.

3*d*. It seldom excites a patient to violence—a matter of great importance.

4*th*. Nausea is not often excited, even during a long operation. Eating, however, should not immediately precede the administration of the gas. It is contended by some operators of large experience, that *pure* nitrous oxide *never* causes nausea. In operations of the eye, or in the pelvic region, this peculiarity renders the gas invaluable, and it always is of much value to the patient's feelings.

5*th*. The shock given to the system by other anæsthetics, is almost as severe as the operation itself, and a slow return to consciousness and the normal condition detrimental to the recovery of the patient. Nitrous Oxide frees itself from the system as speedily as it produces its effects, and so adds nothing to the perils of surgery.

6*th*. It is no small advantage, as before recited, that, while using Nitrous Oxide, the operator feels no inconvenience from its effects, as he does not inhale it, while he cannot altogether escape the fumes of ether or chloroform.

We append a few Letters and Extracts from Letters received from those who have tried the apparatus.

JOHNSTON BROS. *New York, October* 13, 1871.

MY DEAR SIRS:—This afternoon I used the LIQUID NITROUS OXIDE you sent me, in an operation by Dr. J. Marion Sims, in presence of Drs. J. C. Nott, Walker and Nicoll. I have produced anæsthesia rapidly, and *kept it up for fifty* (50) *minutes without intermission*, to the great delight of us all. This is probably the first time in America (possibly in the world) that anæsthesia has been kept up for this length of time with Liquid Nitrous Oxide Gas. I expect to use it again in a few days, in a case of ovariotomy. Please send me a charged cylinder and face-piece. Yours truly,

D. H. GOODWILLIE.

Extract from Letter of Dr. J. Marion Sims.

267 *Madison Avenue, New York, Jan* 25, 1872.

Messrs. JOHNSTON BROS.

Since last September, I have performed a great many operations on patients under its (Liquid Nitrous Oxide) influence. Many of these took the gas for 20, 25, 30 and 35 minutes. One took it for (50) fifty minutes, and I saw no reason why she could not have safely taken it for twice that length of time. Dr. Goodwillie has given the gas to two ovariotomy cases for me, one for 27 minutes, the other for 31 minutes. In these it was all that I could wish.

Truly Yours, J. MARION SIMS.

Hopkinton, N. Y., March 18, 1872.

Messrs. JOHNSTON BROS.

I have again exhausted my cylinder, which I received January 10, and I have drawn out 28 doses. I have heard the complaints of cylinders not holding out, but I think they do not shut them tight. I have now had three cylinders, first one had 25 doses; second, 24, and not all out; third, 28 doses. Enclosed please find cylinder to re-fill, and $6.

Yours truly, J. A SHELDON.

REVISED PRICES.

Complete Apparatus—Surgeon's Case. . . . **No. 1.**	$40 00
Complete Apparatus—Surgeon's Case, with extra sized Bag and Metallic Inhaler. . . . . **No. 2.**	45 00

Boxing either, $1.00.

Each complete apparatus includes a 100 gallon cylinder, filled with **Liquid Nitrous Oxide.**

Cylinder with 100 gallons of Gas.	16 00
Refilling Cylinder.	6 00
Morocco covered case, with ring and thumb screw, velvet lined.	12 00
Polished bl'k walnut " " " " "	13 00

Of these latter we have only a limited number.

Rubber Bag, with covered inhaler tubing, (about 4 gall. capacity)	5 00
Rubber Bag, with covered inhaler tubing, extra size.	7 00
Inhaler, with spring valves, trumpet mouth-piece, with Plated connection.	8 50
Inhaler, latest style, with two way stop cock, adapted to the use of both dentists and surgeons, with connection.	9 50
Key, Nickel Plated.	1 50
Wrench, "	50
Union, Nickel Plated, (nut and tube), for connecting cylinder and gas bag.	1 50
Covered Inhaler Tubing, per foot.	50
Plated Connection to fit old style Inhaler.	1 00

REMARKS.

When the side of a bag has been perforated, it cannot be repaired, but should be replaced. Send on the tubing by mail, and the bag will be replaced. Price. 3 00

As this cannot be done *properly* except by the use of rubber cement, and by persons experienced in the business, we think it every way advisable that it be entrusted to the rubber workers, and not attempted by the dentist.

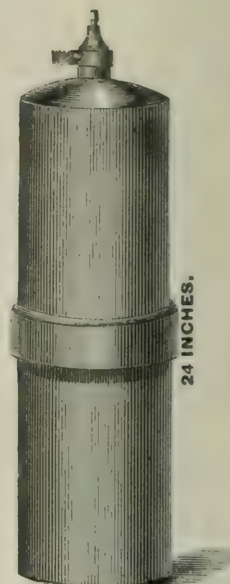
JOHNSTON BROS.,

812 BROADWAY, N. Y.

ONE THOUSAND (1000) GALLONS GAS,

LIQUID NITROUS OXIDE.

1000 GALLON CYLINDER CASE.
Price, $30.00. Boxing, $2.00.



1000 GALLON
CYLINDER.
Price, $36.00.
Boxing, $1.50.

Gas in 1000 gallon lots, 4½ cents per gallon.

The above illustrated apparatus is especially desirable where large quantities of nitrous oxide are used, or where it must be sent a great distance. In this form it is best to ship it by *fast freight*—which makes the cost of transportation very light.

THE GAS CAN BE KEPT FOR ANY LENGTH OF TIME,

AND IS

CONSTANTLY ON HAND AND ALWAYS OF THE BEST QUALITY.

PRICE LIST OF A COMPLETE OUTFIT.

1 Black Walnut Paneled Case, octagonal	$30 00
2 1000 gallon Cylinders at $36 00	72 00
2000 gallons of Gas at 4½ cents per gallon, being 25 per cent. less than price in small cylinders	90 00
1 Bag, with covered Inhaler Tubing	5 00
1 Bag, extra size, with covered Inhaler Tubing	7 00
1 Key, Nickel Plated	1 50
1 Wrench, Nickel Plated	50
1 Union, " "	1 50
1 Inhaler—Metallic—with two way stop-cock and connection	9 50
	$217 00
Deduct Gas	90 00
Cost of Apparatus	$127 00

By purchasing under this plan a saving of 25 per cent. is effected in the cost of the gas, or on 2,000 gallons of $30.00.

It is right that we should here announce that we have in hand a piece of furniture, which—while it will answer the purpose of the black walnut case illustrated—will also serve as a stand for an ornamental Gasometer.

A cut of it will appear in an early issue of the DENTAL MISCELLANY.

As these large cylinders can easily be sent by fast freight (*the* 100 *gallon size is too small to be so risked*) cost of transportation is reduced to its lowest rate.

JOHNSTON BROTHERS,

812 Broadway, New York.

PORCELAIN TEETH.

Our stock is carefully selected from the factories of the BEST MAKERS, and embraces all of the varieties in use, including Continuous Gum Teeth. We will fill orders on short notice for any manufacture of teeth.

Dentists sending us their orders can rely on receiving prompt attention, and on getting manufacturers' best rates.

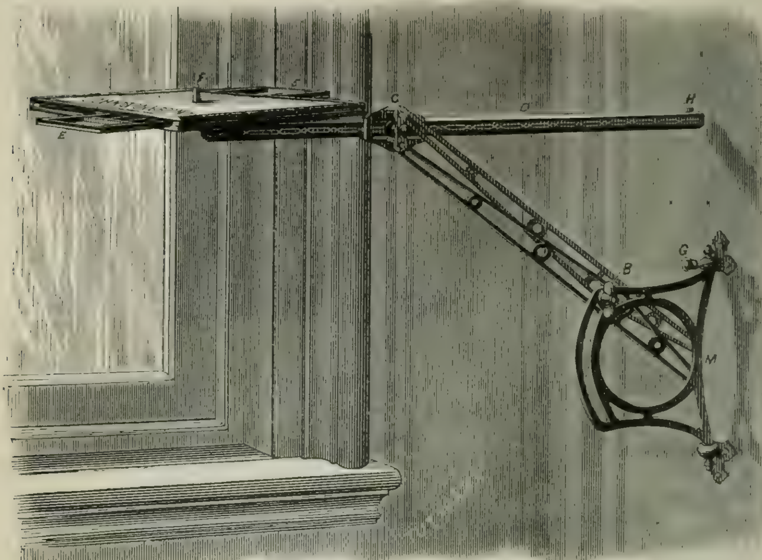
JOHNSTON BROTHERS.

DENTAL GUM—RED.

Johnston Bros.' Nos. 1 and 2, per lb	$2 50
E. Dougherty's Nos. 1 and 2, per lb	2 75
American Hard Rubber Company's, per lb	2 50
Whalebone Rubber, per lb	3 50
Dental Gum—black—per lb	3 00
Gutta Percha, per lb	3 00

JOHNSTON BROTHERS.

MORRISON DENTAL BRACKET.



Price, $25.00. Boxing, $1.00.

The cut represents the table in its highest position, and distant from the wall a little more than half the distance it is capable of taking. By loosening the thumb-screw B, and allowing it to rest in the bottom of the slot, (instead of at the top as represented here,) the table will occupy a position as much below M as it now does above the same point. The extreme range, that is, the distance between the table when at its highest and its lowest position, is 24 inches.

M represents a metal frame which is secured to the wall or other support by screws. It swings from side to side as a gate on its hinges. C. M. represent light but strong metallic arms, hinged at M as a centre and moving up or down. At B is a thumb-screw passing through a slot in the frame M. By it the arms can be firmly clamped at any desired height.

At C is a slide-rest through which the hollow rod D passes freely, and may be clamped at any distance from its ends. At one end of this bar a square table is supported, having in it foil and instrument drawers. This table is capable of rotation round F, which is the burner of an alcohol lamp, the alcohol being contained in D and introduced at its further extremity H. Among the advantages of this bracket are these:

1st. It combines a greater variety of range and movement than any other.

2d. It is rigid in whatever position it is clamped, and will hold 15 lbs. with steadiness.

3d. It provides a clean receptacle for foil and instruments.

4th. It is obvious that a square table is very much more convenient as an instrument stand than a round one.

5th. Its drawers extend through the table and can be opened from either side.

6th. To those having a Morrison Chair it is almost indispensable, as it will follow the chair to either its lowest or its highest position.

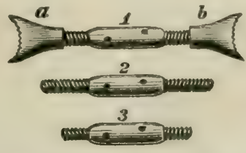
It is handsomely ornamented and nickel-plated throughout, so that it is a very beautiful addition to the furniture of the operating room.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

JACK SCREWS.

Devised by Dr. C. S. LONGSTREET, with Dr. A. McCOLLOM'S Improved Head.



This device is greatly prized by those who have used it.

PRICES.

Full Set, as above, Nickel Plated, screw and two extra bars..	$2 50
Jack Screw, Nickel Plated..........	1 50
Bars, " " each..........	50

JOHNSTON BROTHERS.

FLOSS SILK.

That recently made for us is unsurpassed in purity, in fineness of fiber and in uniformity. Each spool contains twelve yards.

Price per spool..........	$ .15
Price per dozen..........	1 50

A liberal discount to Dental Depots and Druggists.

JOHNSTON BROTHERS.

TOOTH POWDER.

A good saponaceous article.

Price in bulk, per pound..........	$1 00
Five pound lots..........	4 00

JOHNSTON BROTHERS.

ROYCE TOOTH POWDER. (Excellent.)

Per pound..........	$ .75
Five pound lots..........	2 50

JOHNSTON BROTHERS.

STYPTIC COTTON.

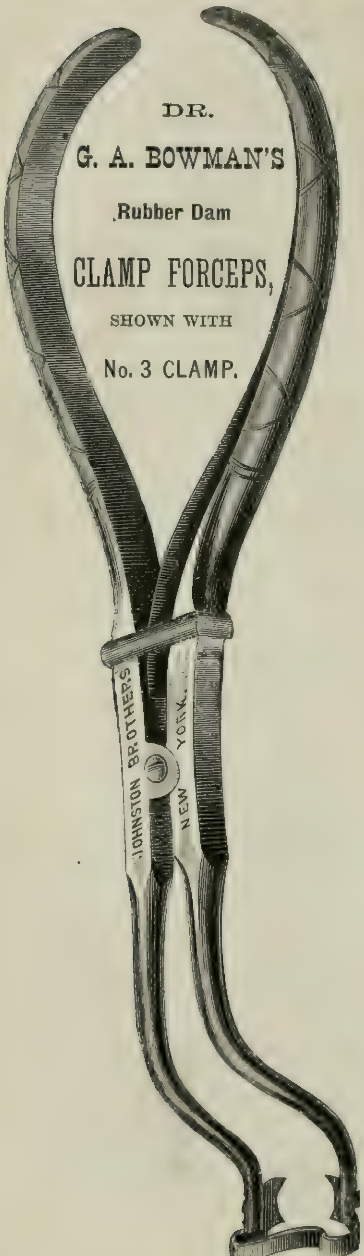
A most excellent article to staunch the flow of blood.

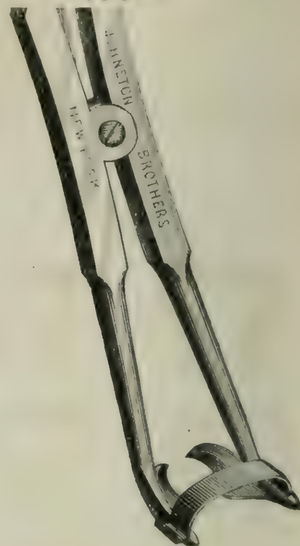
Per box..........	$ .30

JOHNSTON BROTHERS.

RUBBER DAM CLAMP FORCEPS.

Of these we offer two styles, both deservedly popular.





POINTS OF DR. T. C. ROYCE'S

Rubber Dam Clamp Forceps,

Shown with Clamp. Handles are exactly like the other style, (Bowman's.)

Both styles of these Forceps have points accurately adapted to the shape of the clamp at the neck, and hence will be found much more convenient than those hitherto offered the profession in this point of adaptation. (See also advertisement of Clamps.)

If so ordered we can supply either style of Forcep with a band, which will keep the Forcep and Clamp extended and ready for use when the hand of the operator is removed, as shown on the Bowman Forcep.

PRICES.

Forcep, either style	$3.00
" " " Nickel Plated	3.50
Complete set of Clamps, embracing eight forms	4.00
Complete set of Clamps, embracing eight forms, plated	4.80
Clamps, each	50
" " plated	60

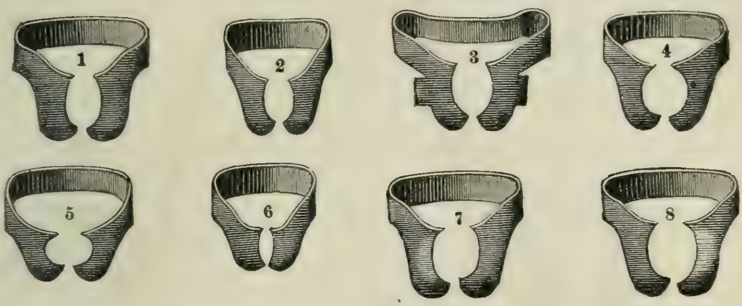
JOHNSTON BROS.

We were never more sure of doing signal service to the Dental Profession than now in offering the

IMPROVED
Rubber Dam Clamps,

INVENTION OF

DR. DELOS PALMER, OF NEW YORK.



Price, set of Eight,	Oil finish,	$4.00.	Each plain,	50 Cents.
	Nickel plated,	4.80.	" Nickeled,	60

For use with Rubber Dam Clamp Forceps.

These Clamps are designed to be placed on the tooth at the commencement of the operation. Afterwards apply the Rubber Dam by passing it over both tooth and clamp.

DESCRIPTION.

Nos. 1 and 2.—Universal Clamp for Molars.

No. 3.—For posterior cavities in molars standing alone.

No. 4.—For third molars, or any molar of a cone shape. This Clamp can oftentimes be turned around while on the tooth, so as to place the bow of the Clamp out of the way of the operator.

No. 5.—For biscuspeds.

No. 6.—For lateral and central incisors.

Nos. 7 and 8.—RIGHTS AND LEFTS.—For cavities under the gum, on the buccal or lingual surface of molars.

Cuts of two favorite styles of Rubber Dam Clamp Forceps will be found on another page.

These Clamps have prominent points of marked superiority over those of other manufacturers.

First. Each has been carefully adapted to the shape of the tooth for which it is designed, *under the personal supervision of Dr. Delos Palmer*, the inventor.

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"THE RUBBER DAM."

PRIZE ESSAY.

By Herbert S. Baylis, D.D.S., of New York.

Some ten years since, Dr. S. C. Barnum, of New York, discovered the applicability of sheet rubber as a substitute for napkins while filling teeth, and it is at present the only means at our command by which a tooth, during an operation, can be completely isolated from the saliva and moisture from the mucous membrane and expired breath. As freedom from moisture is a condition so essential to success in the operation of filling teeth, and one heretofore so difficult to obtain without the use of the rubber, the advantage of this device is rendered evident.

A great many operators use it only in simple cases, if at all, because considerable skill and tact is required to adjust it; but an operator competent to fill the simplest cavity properly, has ingenuity enough to apply it where needed.

It is the purpose of this essay to give the *modus operandi* of using the rubber dam—so to meet the requirements of a large class of dentists who do not use it. To an operator familiar with the use of the dam, written directions would be unnecessary, as he becomes every day more and more proficient in applying it, and new ways of overcoming its little difficulties will constantly suggest themselves to him.

Rubber dam, as found in the market, comes in rolls thirty-one inches in width, varying in different pieces, and of several thicknesses. Cut into quarter-yard strips it will be *wide* enough to meet any case. This gives a sheet nine inches wide by thirty-one inches long, which, if divided into pieces four inches in width, will be found large enough for

use on the incisors and bicuspids, and in a majority of operations on the molars.

The appliances necessary in using the rubber are few, simple, and effective—they are : First—Two different sized punches for making the holes to receive the teeth. The writer has used the following sizes for several years, and has found them to meet every case presented thus far. These make a perforation three thirty-seconds and one-sixteenth of an inch in diameter respectively—several sizes are manufactured and can be obtained at the dealers'. Each operator has his favorite sizes. The punch should be very sharp, its cutting edge free from nick, or fracture ; for if the margin of the hole cut in the rubber be not perfect, it will tear when tension is applied. A piece of leather, soft wood, card or pasteboard, will form a suitable basis on which to place the rubber while cutting the holes. Second—Floss silk, thoroughly waxed to prevent its catching upon uneven surfaces about the teeth. Third—A set of Palmer's Clamps and a pair of Royce's Clamp Forceps, with which to apply them, will be found invaluable. In many instances they entirely supersede the use of the ligature, firmly holding the rubber in place and out of the operator's way, giving him a sense of security to be obtained in no other manner. Lastly—A Cogswell's Rubber Dam Holder intended to keep the upper end of the rubber out of the way. The manner of using these appliances will be given further on.

The proper thickness of the rubber to be used will depend on the amount of resistance it will have to overcome from the lips, cheek, and tongue of the patient and fingers of the operator. For front teeth the thin sheet is preferable, is less disagreeable to the patient, and not so cumbersome or clumsy to the operator. The thick sheet is best for molars, as it requires considerable force to displace it when once in position. Sometimes, however, the teeth are so firmly rooted, and approximate so closely—the surfaces worn sharp or made so by decay—that only the thinnest rubber can be used without danger of cutting it. When possible, all sharp edges should be made smooth, and deposits of salivary calculus removed before applying the dam.

The distance back in the mouth at which the rubber is to be applied will regulate the size of the piece to be used, and will give the proper location for the holes to receive the teeth.

The sheet of rubber must be large enough, when in position, to completely cover the opening of the mouth.

Place a piece of rubber in the mouth directly over and on the teeth

to be protected from the saliva, being careful not to carry the edges of the rubber inside the lips at any point; then with the index finger feel through the rubber the exact location of the tooth farthest back which it is desired should protrude through the rubber. Having done this, remove the rubber from the mouth, keeping the first finger on the place which came directly over the posterior tooth for which the first hole is to be made, until it is placed upon the substance to be cut against in punching the hole. The finger may now be removed and the hole cut through the rubber at the point thus designated. By replacing it, and proceeding as before, the location of the other holes is easily determined.

Always bear in mind the relation of the teeth in question to the median line of the mouth. If they are on the right side, the holes must be made on the corresponding side of the rubber, and vice versa. The space between the holes must be in proportion to the extent of gum to be covered between the teeth, a slight allowance being made for turning the edge of the rubber under at the neck of the tooth. The further back in the mouth it is placed, the greater should be the margin between the holes and the upper edge of the rubber. If too small a margin is left the sheet will fall within the line of the upper lip or teeth, permitting the saliva collecting on those parts to run down into the dam. In using the rubber on front teeth its adjustment is very simple in most cases. If possible, it should be applied to several teeth for each filling, thus gaining light, affording a firm rest for the hand, and keeping the rubber more securely in position, and giving greater space in which to operate. Sometimes, however, there are small cavities in the grinding surface of molars where one perforation will be sufficient. Floss silk is used to carry the rubber between the teeth, and should be thoroughly waxed before using.

When it is desired to hold the rubber in position during an operation, with the silk alone, the piece should be long enough to obtain a firm hold on it—by twisting it about the fingers. Having selected the piece of rubber to be used, the holes to receive the teeth being cut, place the rubber in position in the mouth; then with the ligature, beginning with the back tooth, carefully force the rubber between the teeth, and in contact with the gum, when the ligature should be slowly drawn back and forth, which will bring that portion of rubber between the teeth in position for the next step; now, by passing the ligature entirely around the neck of the tooth, drawing it tightly, again working it back and forth, it will bring the edge of rubber surrounding the tooth just under

the free margin of the gum, where, if undisturbed, it will exclude all moisture from the exposed portion of the tooth. This process is to be repeated on the other teeth until the dam is in position. The rubber should be applied, when possible, by commencing on the back tooth and proceeding forward; but when the mouth is small, and great resistance is met with from the tongue and cheeks, and it is difficult to get the rubber between the teeth, it is best to commence on a front tooth and gradually work it back.

The ligature, under favorable circumstances, will hold the rubber sufficiently secure to admit of completing the operation without the employment of clamps; but when the operator has once become accustomed to the use of the latter he will find himself relieved of great anxiety regarding the liability of the rubber to become displaced, and permitted to concentrate his whole attention upon the operation in hand. Palmer's clamps are designed to hold the rubber securely in place and to prevent it from folding around the crown of the tooth and obstructing the operator's line of vision, thus overcoming the two greatest difficulties found in using the ligature alone; for in many cases sufficient hold cannot be obtained on the tooth with the ligature, to prevent its slipping off during an operation. In filling cavities near or partially under the gum, the proper clamp, when carefully adjusted, will force the gum out of the way and clasp itself firmly to the neck of the tooth. These clamps come in sets of eight, two of which of the same general pattern, but of different sizes, are designed to be used on either of the molar teeth, and are called "universal," in contradistinction to a pair of "rights and lefts," one flange on each of this latter pair being broader than the other, so as to hold the sheet of rubber away from the crown of the tooth in filling cavities on the buccal or lingual surface of molars. Another is to be applied in filling posterior cavities in molars standing alone; the bow of this clamp projects posteriorly, and is curved concavely—holding the rubber towards the gum, which prevents it being drawn around the crown of the tooth, thus giving a clear space through which to approach the cavity. One is intended for use on the dentes sapientiæ, or other molar presenting a nearly round cervix. It can be turned while on the tooth, to give the bow a lateral direction when desired. For bicuspids and front teeth there are modified forms of the foregoing, and, like them, are admirably adapted to their purpose. They are to be used on upper or lower teeth. The bow of the clamp should always present posteriorly. The clamp should be put on the tooth before applying the rubber when using it on back teeth. The large sized punch should always be em-

ployed, to make an opening large enough to allow the bow of the clamp to pass through without injury to the rubber.

After having placed the clamp in position on the tooth farthest back, that is to be included in the dam, carefully stretch the margins of the hole first over the bow of the clamp, then over the crown of the tooth, bringing it in contact with the gum ; allow it to contract around the neck of the tooth, between the clamp and the gum. The rubber will now be held secure by the clamp and prevented from slipping when stretching it over the other teeth. If any difficulty is found in passing the rubber between the teeth, the floss silk is to be used ; also for holding the rubber on the teeth anterior to the clamp. The edges of rubber surrounding the necks of the teeth should always present toward the gum, otherwise there will be a leakage. This may often be accomplished by using a flat burnisher to turn the edges under.

The rubber dam holders can now be attached. This appliance is mentioned particularly, because it accomplishes its purpose completely, requiring less attention when once in place than any other device of which the writer is cognizant. It consists of an elastic braid about two feet long, to one end of which is made fast a narrow brass clamp closed by a sliding band ; a similar clamp is attached to the braid by sliding rings, and is prevented from coming off by a ring sewed to the free end of the braid. To apply it the elastic is passed around the head of the patient and each upper corner of the rubber is made fast in the clamps ; then by pulling upon the free end of the elastic, the rubber is drawn closely across the patient's face and cannot fall in the way, allowing the patient to raise the head when necessary. A napkin should be placed on the patient's chin, between it and the rubber, to absorb the saliva that may find its way out of the mouth. To prevent the saliva overflowing the mouth, the patient should be directed to close the mouth as near as possible, and swallow. This should be done when the operator turns to pick up an instrument or gold, as then it will not interrupt the operation. A small bottle containing white gutta-percha dissolved in chloroform, and a camel's-hair brush to apply it, should always be kept ready for use in case a puncture should accidentally be made in the rubber while in the mouth. Carefully dry the rubber around the puncture, then apply a drop or two of the gutta-percha, allowing the chloroform to evaporate before proceeding with the operation. If not subjected to much stretching it will serve a very good purpose. A perfectly white surface may be produced upon the rubber by painting it over with the white guttta-percha solution, thus reflecting a large amount of

light into the cavity—a very great advantage in posterior cavities especially. This may be done before or after applying the rubber, and can be washed off with very little trouble.

Before the introduction of the clamps a great many ingenious and useful devices were resorted to for retaining the rubber in place. These it is not necessary or expedient to describe in this essay, for, by the dextrous use of the appliances mentioned, an operator can accomplish better results, with less trouble, than with all the other appliances at present in use.

We have now given a general description of the rubber dam, its appliances and mode of use. Individual cases will present themselves, which will require a deviation from the course here described, and when any difficulty arises "Necessity, the mother of Invention," must be relied on as the best guide to success. "It is easy to add to things which have once been invented."—*Qui docet, discit.*

ARTIFICIAL SUBSTITUTES FOR PARTS LOST BY DISEASE.

By C. A. Brackett, D.M.D., Newport, R. I.

C. P. M., now aged about thirty-five years, was much disfigured about four years since by the ravages of secondary syphilis, losing a portion of the upper lip, the entire nose, including the turbinated bones, and both the hard and soft palates, making of the nasal and oral cavities one vast chasm. The man is a mason by trade, and has a large family dependent upon him for support. In his disfigured condition he found it difficult to obtain employment. Indeed, he looked so repulsive that the City Marshal of the place where he has his residence had been petitioned to have him confined in some institution.

Being consulted in the case, I consented to try to do something for the improvement of his appearance.

The syphilitic ulceration having been cured, there seemed to be no reason why artificial appliances might not be introduced. An artificial velum was precluded by the complete destruction of the palatal muscles, so that there were no means of supporting and moving such a contrivance. Hence, I confined my efforts to making an inflexible obturating plate and substitutes for the external parts.

In the arch were several loosened teeth and diseased roots. These I removed and waited for the healing of the parts. The cuspids, first bicuspids, left lateral incisor, also the left second and third molars, were in comparatively healthy condition. The preservation of these was most important for steadying and in part supporting the plate, it not being possible to render atmospheric pressure of avail for that purpose. An impression of the parts to which the plate was to be fitted was taken in wax. The obtaining of a good impression was very difficult, the mouth being narrowed and the lips bound down with cicatinial tissue. The cup used was barely wide enough to enclose the teeth. Upon its posterior edge was riveted a plate of German silver, to increase its length. To get the impression from the mouth required considerable force after the wax had been made rigid with ice, and the portion projecting into the open space enclosed by the arch had been cut away. On a model from this impression a pattern plate was moulded and the bite taken in the usual way.

Patient as disfigured by Disease. Patient wearing Appliances described.

The obturator was made of ordinary vulcanite. It fitted the alveolar border, supplied the place of the hard palate, and extended back to within about one-half inch of the posterior wall of the pharynx. I should have preferred to have left a rather smaller opening at the back ; but the plate was as long as could be made in the largest flask to be found. In front the missing incisors were replaced with plain artificial ones,

and the gum was imitated with pink rubber. The plate was closely fitted to the remaining natural teeth, but had other means of support, to be explained directly. Care was taken that pressure applied to a tooth in any direction should be duly counterbalanced.

In modeling the pattern for the nose I was greatly assisted by an impression of a nose which I was told resembled the lost member of the patient. This pattern was accurately fitted to its place on the face, and then copied in vulcanite. Projecting from the centre of the lower part of the nose, close to the remains of the upper lip, was a steel pin, made to enter a small hole drilled on the mesial line in the artificial gum of the plate. Vulcanized in the upper surface of the obturator, about midway of its length, was a gold eye, or staple, to which was fastened one end of a spiral spring of platinized gold wire a little more than an inch in length. Upon the opposite end of this spring was a small gold hook to fit another staple in the posterior extremity of the artificial nasal septum. The plate being put in place and the spring brought to the opening left by the destruction of the natural nose, the artificial nose was attached by means of the hook and staple, and all the appliances were held very firmly in position.

The nose was painted by an artist to match the skin of the face, making it a very good counterfeit of a nose of flesh. To conceal the deficiency in the upper lip, as well as the external connection between the false gum and nose, an artificial moustache to match the beard was procured of a professional hair-worker. This I attached to the front of the artificial gum with some small watch screws, also supporting it in the center with a loop around the steel pin. This arrangement the patient has since improved upon by moulding a piece of tin to fit over the place where the moustache should grow, sewing to it the artificial moustache, and attaching the whole to the central pin.

The appliances were put in place January 16th. Since that time they have been worn constantly with comfort and to the satisfaction of the patient and his friends. His speech is improved, he has no trouble in eating, and he prefers to sleep with all the apparatus except the moustache. He is able to remove and reapply the mechanism very quickly and without assistance. His principal annoyance is from the secretion of the inflamed mucous membrane when he has a cold, the artificial nose not being quite so convenient to "blow" as the natural organ.

Gold may be readily cast; but it contracts so much in cooling that the process of casting is seldom employed in the arts.

DENTAL MALFORMATIONS.

By Robert Baume.

[VIERTELJAHRSSCHRIFT FUR ZAHNHEILKINDE.]

II.—Enamelless Malformations.

I received lately from Herr Stuber, of Berlin, a present of a very rare preparation. It may be considered as one of the enamelless malformations, which I have previously described under the name of "rare malformations."*

I had intended, after having made public the first five cases found under peculiar circumstances, to make no further communications, until I had perceived observations and explanations from other sides. By chance, Herr Stuber discovered, under special conditions, a similar malformation, which he allowed me to have for closer observation. I will here give a description.

In the mouth of a Javanese, a man of about 35 years, the right upper first molar caused severe pain, and on that account was obliged to be removed. Under close observation, it appeared that, at the neck of this tooth, between the mesial and lingual fang, a rounded hard formation of about three millimetres in breadth was attached. The attachment of this rounded body with the molar was effected by means of a fibrous band of about three millimetres in length. The body in question must then, according to the accompanying details, have lain in the septum between the first molar and second bicuspid. On observing closely this formation, there was observed a somewhat uneven yellowish surface which appeared transparent. It was recognized without difficulty, that the body in question was formed out of tooth substance; and, indeed, the surface apparently from cementum. Notwithstanding the most careful examination having been made of the outer surface of this body, not the slightest trace of enamel could be found.

I prepared some sections of this little formation, in order to ascertain whether, under the microscope, the want of enamel could be proved. I made three sections, two of which were from the surface. In these two last sections, no trace of enamel was to be seen; there was only found bone corpuscles, therefore we had here cementum which formed the outer upper surface. The third section, which was cut through the middle, showed the following conditions. Two different substances could plainly be recognized, the one in the centre being dentine, the

Vierteljahrsschrift, 1872. S. 23, N. 189.

second which surrounded the dentine, cementum, as had already been proved from the first two sections taken from the upper surface. No enamel was to be found in these preparations. According to the whole arrangement of the substance, it may be concluded that there was no enamel existing here.

With respect to the dentine present in this malformation, it appeared normal. The dentinal canals ran pretty direct, and centripetally towards a small cavity in the centre. The second part, the cementum, is somewhat remarkable, as seen under the microscope. *There appeared —namely, in that portion of the malformation which represented the crown of the tooth—a kind of button which was formed of cementum* in the manner which I have described in former essays.* Otherwise the dentine is surrounded on all sides by cementum, which does not show any abnormal appearance. A conspicuous circumstance, however, is the periphery, Howship's lucunæ appear a proof that resorbtion of this formation had set in.

Between dentine and cementum, which are in close contact, appeared interglobular cavities. In this formation the dentine and cementum do not show any striking digression from their normal condition, which I had generally found to exist in previous cases. The want of enamel is here, however, very striking. It may be believed that no enamel was present, when from so small a body three sections were examined, and we may consider that the details have been exhaustively studied. From these circumstances, and strengthened by the consideration of malformations previously described, I consider that this was one of the enamelless malformations. I consider this proof of importance, because, up to the present time, no malformation has been known in which the fact of enamel being entirely wanting has been established. We find, even on dwarfed teeth which are hardly so large as the above malformation, enamel on the outer surface in the mouth at the first glance. It has hitherto been considered that the development of the tooth was dependent on the presence of an enamel organ, that is to say, on the division of the epithelial element of the mucous membrane of the mouth. As will be seen, however, from the six cases published by me, tooth structures may be formed which appear normal under the microscope, without a trace of enamel. The above malformations have apparently been developed from a papilla enclosed in a tooth sac.

Curiously enough, hitherto *I have only found these enamelless malformations in the neighborhood of the bicuspids of both jaws.* Two of these

* *Vierteljahrsschrift*, 1872. S. 23, und 27, Figs. I. und III., bei a.

formations lay in the septum between the two bicuspids, and the other two in the septum between the second bicuspid and first molar.

It is, at all events, a remarkable occurrence, that I should only have seen this malformation in the neighborhood of the bicuspids. Other accounts in literature have undoubtedly shown that these bodies appear in the districts of other teeth. There is, for example, a preparation of J. Salter's shown in Tomes' work. This representation shows us an incisor to which is attached a curiously formed appendix. This appendix is like, if the drawing is correct, an enamelless malformation as it appears outwardly. Salter describes this formation as "warty hypertrophy." From this example, then, we know that these bodies also appear in the neighborhood of the incisors.

We find a second case in the Atlas of Heider and Wedl, in Figs. 28 and 29. Apparently, in this case it is, as Heider thinks, the meeting of the wisdom tooth with a supernumerary tooth germ. Notwithstanding the want of enamel, a supernumerary tooth could have occurred, for it is possible, as may be seen from the above facts, to have a formation of tooth structure without the participation of the enamel organ. The best proof for this assumption is the spontaneous appearance of such enamelless malformations.

It is proved in the case communicated by Heider and Wedl, that such abnormal developments of enamelless tooth structure may take place in the neighborhood of the wisdom teeth. The six malformations discovered by me are very small, and vary between 2-6 millimetres. From the case, however, described by Heider and Wedl, we may see to what a monstrous expansion such supernumerary enamelless tooth germs may be developed.

The proof of the fact that such enamelless tooth structures exist, is, at all events, of great importance in the history of the development of the teeth. On these grounds I have again allowed myself to bring forward this question.—*London Monthly Review of Dental Surgery.*

A NEW APPLICATION OF GYPSUM.

Gypsum mixed with 4 per cent. of powdered marshmallow root will harden in about one hour, and can then be sawn or turned, and made into dominoes, dice, etc. With 8 per cent. of marshmallow, the hardness of the mass is increased, and it can be rolled out into thin plates, and painted or polished.—*Scientific American.*

IRREGULARITIES.

Continued.

By NORMAN W. KINGSLEY, M.D.S., D.D.S.

In my last article I described a V shaped dental arch, and showed by how simple a means the deformity could be corrected. In the present article I propose to show a case very similar in form, but one which, if it had been treated by the same means only, would have ended in failure.

Fig. 1.

The patient was a young lady of about seventeen years. Fig. 1 shows the profile view of both jaws, with the teeth in contact and the advanced position of the superior incisors, together with the articulation of the bicuspids and molars within those of the lower jaw. Fig. 2 exhibits

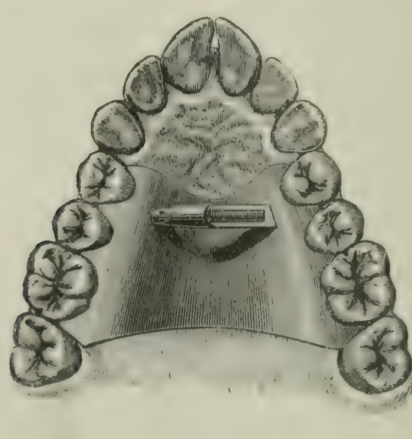

Fig. 2.

the pointed character of the dental arch and the irregularity in the po-

sition of the teeth along the line. This twisted, pinched, and tipped up condition of the incisors, but especially the centrals, gave a peculiar expression to the upper lip; distorting the facial profile and destroying the symmetry of what was otherwise a more than usually intelligent and comely face.

A comparison of Fig. 2 with Fig. 2, page 131, of the last number of this Journal, will be necessary to a full understanding of the different treatment demanded. In the former case the line from the proximal edges of the central incisors to the posterior teeth on each side is nearly straight; the variation from a straight line is a slight but regular curve outward.

The teeth stand nearly in contact with each other; so nearly that within a very few days after pressure was applied they all met.

The bearing of the teeth upon each other was then practically the same as would be that of the separate stones forming an arch, and any change of shape in the arch, as the result of pressure upon one point, must be in an outward direction.

A reference now to Fig. 2 of the present number will disclose the difference.

All of the teeth anterior to the molars are so related to each other that pressure on one point would cause the arch to collapse. Even if a plate had bridged the palate and came in contact with the teeth at the sides, so as to prevent a collapse, no force upon the centre as they now stand would have carried those teeth outward. A fixture operating like the T on page 131 would not have affected the bicuspids and molars, but would have drawn the middle incisors toward the centre in the same twisted condition, and would have moved the laterals and canines irregularly apart.

The widening of the arch, therefore, which is of primary importance, must be effected by other means.

The correction of the deformity necessitated three separate stages and three distinct operations, as follows: first, the widening of the arch; second, the twisting of the central incisors, and third, the reduction of the V to a proper curve.

The widening was produced by a jack-screw; that most effective of all known agencies wherever it is applicable.

Its mode of adjustment is very fairly shown in Fig. 2. A plate of vulcanite was made as there represented, so thin and elastic along the centre that it would straighten under moderate force, and so stiff where it came in contact with the teeth that it would not yield. The attach-

ment of the jack-screw is made after the vulcanite plate is finished, and is readily accomplished by carefully cutting a little mortise in the plate on one side and allowing the point of the screw to rest in a pit on the opposite side.

Care must be exercised that the mortise be so nicely cut as to prevent that end of the screw from twisting, and also that neither of the holes pass through the plate. The power of the screw may be distributed *ad libitum* to different points, and in a greater or less degree, according to its location in the plate. In the present instance it was desirable to move the molar teeth but slightly, the first bicuspids considerably, and the second bicuspids on a line with the others. The screw was placed against the first bicuspids, or rather against the gum above the bicuspids; the principal object of so placing it was to give as much freedom to the tongue as convenient. It was applied on the 19th of April, and the screw turned until a firm pressure was felt. Slight turns of the screw were made daily or oftener by the patient herself, for a period of twelve days, when it was found that the first bicuspids on each side had each moved more than half their diameters, and that all the teeth on both sides were articulating outside their corresponding ones of the lower jaw. This increase of width is very well shown in Fig. 3, although the vulcanite plate, as here described, came in contact only with the bicuspids and molars, and the jack-screw operated directly upon those teeth. Nevertheless the six front teeth were affected by the movement, and the canines were wider apart as the result of the treatment. This was owing undoubtedly to the position of the screw being so high upon the plate that the surrounding processes, as well as the teeth, were involved in the movement. During this period the plate and screw were worn night and day, but were removed daily for cleansing. There was very little soreness; none to cause complaint by the patient, and not enough to seriously interfere with mastication.

On the second day of May, thirteen days after its adjustment, the teeth at the sides being in the position desired, the screw was removed and the second stage of the treatment was commenced, which was the twisting of the central incisors and disengaging them from the lock and overlap of the laterals. This apparently trifling operation is often one of the most difficult to accomplish. An almost infinite variety of methods have been resorted to with more or less success, and the same method often in what seemed the same presentation, but with a very different result. In this instance a vulcanite plate was required to retain the teeth in their spread condition, and its presence was made available for attachments for elastic ligatures.

The plate was adapted to the palatal surfaces of all the teeth, as seen in Fig. 3. A little hook or catch of gold wire was inserted opposite the

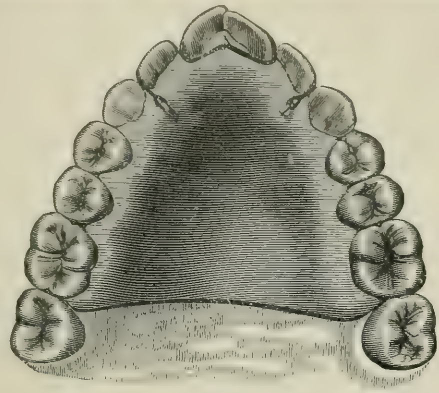

Fig. 3.

canine teeth, and a little staple or loop of the same wire at the apex of the plate between the centrals.

Previous to insertion and adaptation, a ring of rubber cut from tubing was caught over one hook, passed through the loop at the apex and caught on to the other hook. The plate was then introduced into the mouth and the elastic strap drawn over each lateral incisor, as seen in the engraving.

A little reflection will recognize the philosophy of its action. The tendency of the elastic ligature to contract to a straight line operates only on the inverted corners of the centrals. Its action would be equally upon the laterals, were it not that they are in contact with the plate and cannot be displaced.

The real and only action, therefore, is between the outer surface of the lateral and the gold loop at the apex. The tendency of the rubber to straighten between these two points, twists and throws out the inverted edge of the centrals.

It accomplished the desired work, but very slowly as compared with the preceding movement, for it was not until the 24th of June, a period of more than seven weeks, that the third and last stage was entered upon.

In passing, let me remark that there was no effort made in this case to produce a given result in the shortest possible time consistent with safety. A great work had already been accomplished in a limited time in the widening of the alveolar arch. That condition was being sustained by the plate, and becoming settled and firm.

It was better, when the time was not limited, to take the next step in conjunction with that retaining plate, and by a slower process, than to adopt a much more rapid one, which would involve a more complex appliance and more constant attention on the part of the operator.

The form of the arch when the third stage of treatment was entered upon was much the same as that shown in Fig. 2, page 131 of a former article ; that is, a V-shaped arch with the teeth regularly placed along the line, each side the middle ; and the reduction of this V shape to a proper curve was brought about by the same kind of an appliance.

The third plate answered the same purpose as the second in retaining the side teeth in their widened position, and differed from the second in bearing so upon the central incisors as to prevent their returning to their former twisted position, and in having attached to it catches, ligature and T, precisely the same as shown in Fig. 2, page 131.

This fixture is not illustrated here, as it would be but a repetition of the one alluded to.

There is, however, this difference to be borne in mind ; when it was applied, the vulcanite plate came in contact with the lingual surfaces of the front teeth, and was cut away from time to time as the teeth were brought in contact with it.

This course was adopted for two reasons : first, the former condition of the front teeth being twisted, there was danger, if left too free, of returning to that position, and thus destroying the lateral pressure upon the adjoining teeth ; and second, the summer vacation came on, and the patient could be seldom seen.

For this last reason the reduction progressed slowly, and this fixture was used for five months, accomplishing the double purpose of carrying back the teeth against the plate and retaining them there until the plate was still further cut away.

The desired curve being attained, the final retaining plate, as seen in Fig. 4, was substituted. Other forms of a retaining plate would have secured the same results, but this one was adopted because of its simplicity as well as effectiveness. It was a simple plate of vulcanite with a small gold wire imbedded in it, and passing to the outside of the six front teeth, through a small gap between the cusps of the canine and bicuspid on each side. If the articulation of the teeth of both jaws had been such, on occlusion, as to shut up this gap, then this kind of a retaining plate could not have been used.

There were many points in connection with the above described case, of the utmost interest to those engaged in treating irregularities. They involve the origin of the deformity and the esthetic results ob-

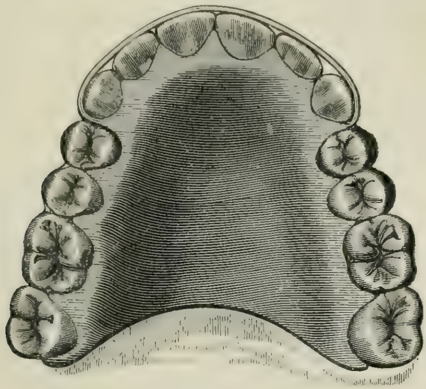

Fig. 4.

tained by the treatment. I believe now that it would have been better to have extracted one tooth from each side of the mouth ; but these matters will be referred to again in a future article.

OXYGEN GAS AS A REMEDY IN DISEASE.

From New York Medical Journal.

By ANDREW H. SMITH, M.D.,
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CHAPTER IV.

THE USE OF OXYGEN IN DISEASES INVOLVING DEFECTIVE RESPIRATION.

The diseases to which the use of oxygen is applicable fall naturally into two classes ; those in which respiration is more or less at fault, and which are for the most part acute ; and those in which there is defective nutrition, or excretion, and which are chiefly chronic.

In general terms it may be asserted that any disease which gives rise to dyspnœa will be benefited, at least temporarily, by the use of oxygen, in so far as the dyspnœa is concerned.

The manner in which this is effected is sufficiently obvious. The essence of dyspnœa consisting in a disproportion between the quantity

of venous blood brought to the lungs and the amount of oxygen which finds access to the air-cells, it is plain that, by causing the patient to breathe an atmosphere containing more than the usual proportion of oxygen, the dyspnœa may be *pro tanto* relieved.

This is well illustrated by the following experiment :

Experiment XX.—*January* 15, 1860.—Tracheotomy was performed on a rabbit, and a tube provided with a stop-cock was tied in the trachea in such a way that no air could enter the lungs, except through the tube. The stop-cock was now turned until symptoms of suffocation were produced ; the eyes protruded, the pupils dilated, and the whole body was convulsed. The free end of the tube was then brought into a stream of oxygen, when the symptoms were at once relieved, and, though the breathing was labored, there were no signs of actual distress.

Asthma.—Probably there is no other disease affecting the respiratory organs which so immediately suggests the use of oxygen as does asthma. The dyspnœa is often very severe, and the indications of imperfect aëration of the blood very apparent. Every movement, every gesture of the patient, is a plea for more air. It is not remarkable, therefore, that this should have been one of the first diseases in which oxygen was applied. Beddoes employed it in twenty-two cases, ten of which were cured, nine relieved, and three did not receive benefit.

Demarquay describes two cases, one of which was definitely cured, the other greatly relieved. Birch reports a case of absolute cure. Dr. J. Hooper also reports a case greatly relieved. *Brit. Med. Journal*, Mar. 15, 1862.

Dr. Howard Pinkney, of New York, administered it recently in one case with the effect of relieving the paroxysms, and of reducing most decidedly their frequency.

Dr. Beigel, of London, reports three cases, two of them hereditary, in which oxygen was used conjointly with inhalations of liq. potas. arsen. The oxygen in each case relieved the paroxysms, and apparently contributed to remove the tendency. At all events, the paroxysms became less and less severe, and occurred at longer intervals, and finally ceased altogether.

The case of the late Secretary Stanton presents an instance in which oxygen was the means of averting a great deal of suffering. He was subject to severe paroxysms of asthma, which, during his last illness, constituted a serious aggravation of his condition. His medical attendant, Surgeon-General Barnes, of the United States Army, procured from New York a supply of compressed oxygen, of which from

three to four cubic feet were inhaled daily. It controlled the paroxysms completely, and, so far as the asthma was concerned, met every indication. In a recent conversation with me, General Barnes expressed himself warmly in favor of the gas in similar cases, and stated that both he and his illustrious patient were entirely satisfied with its effects.

I have myself administered oxygen in several cases during the paroxysm, with the effect of causing almost instant relief; but, as it was not continued during the intervals, no permanent benefit was experienced.

It will be observed that three of the cases reported by Beddoes received no benefit whatever. I have also had a similar experience. A clergyman, subject for many years to infrequent but prolonged attacks of asthma, which had completely baffled all previous treatment, was seen by me at the onset of a paroxysm. The respiratory movements were very rapid and extremely energetic, and the dyspnœa considerable. Still there was no evidence whatever of imperfect aëration of the blood. The countenance was flushed, but not in the slightest degree dusky. Oxygen was administered very freely, about four gallons every half-hour, but with no appreciable relief to the dyspnœa.

Pulmonary Emphysema.—Dr. Beigel reports a case in which the shortness of breath was so great as to prevent the patient walking more than a few steps at a time. By inhalations of oxygen, one gallon every three hours, a prompt amelioration was brought about, and at the end of six weeks the distressing symptoms had nearly disappeared. During this time there was no other treatment than inhalations once or twice a day of solution of common salt, two grains to the ounce for twelve days, after which "pulverized" pure water was substituted. Subsequent to this time a solution of tannin and morphia was used in connection with the oxygen, and in less than two months from the commencement of the treatment the patient was able to return to his business, though he could not dispense with the oxygen for more than a few days at a time without a return of dyspnœa.

Two months later the unnatural prominence of one side of the chest, which previously existed, had sensibly diminished, the area of tympanitic sounds was much decreased, and the amount of respiration had increased from 2.150 to 3.200 cubic centimetres.—*Beigel on Inhalation*, p. 143.

In this case it is evident that something more was accomplished than mere present relief of the dyspnœa. A radical improvement in the disease itself was effected. This was perhaps due to the diminished

force of the respiratory movements, and the consequent lessening of the strain upon the delicate tissues of the air-cells, resulting from the relief to the dyspnœa.

A case is reported by myself in the May number of the *New York Medical Journal*, 1869, in which the gas was given, but only for a short time. The dyspnœa was greatly relieved, the countenance lost its livid hue, the pulse fell from 122 to 100, and the respiration from 36 to 20. The relief continued but a short time after the oxygen was discontinued, but was again experienced when its use was resumed.

Croup.—Dr. Beigel describes a severe case of croup, in which the usual modes of treatment had been exhausted without avail, the respiration being 40 per minute and noisy, the pulse too frequent to be counted, lips livid, and face pale and agitated by convulsive movements. The inhalation of one cubic foot of oxygen was followed by decided improvement, and in the course of two or three hours the child fell asleep, awakening convalescent, and making a prompt recovery.—*Beigel on Inhalations*,' p. 105.

Dr. Miquel reports a case with symptoms identical with those above mentioned, which was immediately relieved by the use of oxygen, and ultimately recovered.—*Half-Yearly Compendium*, Jan., 1869.

I have been called in to give oxygen in several cases of croup, but always in the last stages, when the long-continued dyspnœa has led to mechanical engorgement of the lungs, and to poisoning of the nerve-centres by the circulation of unaërated blood. Under these circumstances, although I have been able to relieve the dyspnœa in a measure, still, death has been the result. The termination in such cases is usually the same when the trachea is opened, even if the respiration is thereby made easy.

It is my firm conviction that oxygen will do in most cases of croup all that could be done by tracheotomy, but neither the one nor the other is competent to undo the mischief wrought by severe and protracted dyspnœa. Hence the practical rule in the use of oxygen is the same as that in the use of the knife—*use it early.* There is nothing painful, nothing horrible, nothing dangerous about it. Why, then, should it be resorted to only at the last moment, as if it were a more desperate remedy even than tracheotomy?

Diptheria.—Dr. Beigel gives the history of two cases in which oxygen was used in connection with inhalations of various atomized solutions. In the first case, that of a child six years old, a single administration of the gas roused the patient from a state of coma: the eyes, before dull,

became brighter, and the pulse rose from 60 to 75. After five inhalations the tendency to coma disappeared entirely, the countenance assumed a ruddy color, and the appetite returned. The quantity used at each inhalation was one gallon.

In the second case the benefit was also immediate and decided.—*Beigel on Inhalations*, p. 114.

I am permitted to refer in advance of publication to a recent case which I saw with Dr. G. T. Elliot, in which inhalation of oxygen was of great service. The patient, a child two and a half years old, presented well-marked diptheritic croup. The dyspnœa, which was very decided, was greatly relieved by the gas, and it was Dr. E's opinion, as well as that of other gentlemen who saw the case, that the oxygen also aided materially in overcoming the tendency to death by asthenia, and that without it a fatal termination would have been inevitable. The inhalation was kept up almost continuously for a week ; the last three days only as a tonic, the tendency to asphyxia having ceased on the fourth day.—[SECOND ED.]

In one case of diptheria I was called, only when the child was in *articulo mortis.* For four hours life was sustained by the gas, which could not be withheld for more than a few minutes at a time without producing suffocation. At the end of that time the parents were informed that the case was hopeless, and it was left for them to continue the gas as long as they saw fit, a supply being prepared beforehand. The inhalation was continued an hour longer, and then abandoned. Death took place within five minutes after the gas was withheld.

In this disease, in addition to the impediment to respiration, we have to contend with a septic condition of the blood, tending greatly to depress the powers of life. I believe, with Dr. Beigel, that this latter condition may be prevented or remedied more surely by inhalations of oxygen than by any other resource we possess, while, at the same time, the danger of death by apnœa is obviated.

For the removal of the local affection the usual remedies may be simultaneously applied.

Pneumonia.—Dr. Golden reports in the *Lancet*, for March 10, 1866, a case of double pneumonia accompanied by great dyspnœa, which resolved in four days under the use of oxygen.

I have seen a case in which a circumscribed pleuro-pneumonia, occurring in the course of chronic pyæmia, was apparently aborted within thirty-six hours by the use of the gas.

Although the existence of acute inflammation, as a rule, precludes the

use of oxygen, yet, when respiration is seriously interfered with, the danger from this source outweighs all risk from any possible increase of the inflammation which the use of oxygen may occasion. In a case of double pneumonia, therefore, I should not hesitate to employ it, nor should I allow any case of this disease, which appeared to be tending toward a fatal termination, to proceed without a trial of its effect. The fear formerly entertained, that oxygen would excite pneumonitis by its *local* action, is refuted by its entire history as a remedy. Especially in the typhoid form of pneumonia, I should expect great benefit from the gas.*

Dr. Butler, of New York, reports, in the November number of the *New York Medical Journal*, a very interesting case of chronic pneumonia, in which the deposit was rapidly absorbed under the use of oxygen.

Capillary Bronchitis.—In this affection oxygen is of great value, not only in relieving the dyspnœa, but also in diminishing the formation of mucous in the lungs, which latter is in a great measure the mechanical result of excessive inspiratory effort. For, whenever the inspiratory effort is in excess of the capacity of the air-passages to supply the necessary air, the atmospheric pressure within the chest is necessarily diminished, and turgescence of the blood-vessels of the lungs follows, as certainly as hyperæmia of the skin follows the application of a cupping-glass. Inhalations of oxygen, by satisfying the *besoin do respirer*, remove the necessity for the employment of excessive inspiratory force, and in this way lessen the congestion of the mucous membrane, and diminish the tendency to effusion. Hence it is not only palliative, but curative.

This is illustrated in a case reported by myself, in the *Medical Record* for June 15, 1869.

The patient, a child two and a half years old, was at the point of death from bronchitis, intercurrent with measles. The respiration was 80, and accompanied by mucous rales audible at some distance from

*Dr. Frauenstein has furnished me the notes of a case of pneumonia in a child two years of age, involving the lower half of the left lung. The disease was ushered in by convulsions so persistent and severe as to require the use of chloroform. This agent, however, produced alarming depression, and oxygen was resorted to to correct its action, which it did very satisfactorily, but only to open the way for a return of the convulsions; chloroform was therefore repeated, and its action kept within safe limits by the oxygen, until the tendency to convulsions passed away. The oxygen was then continued until, at the end of three days, the inflammatory products had become almost entirely absorbed, and the pulse, respiration and temperature had fallen, and the child desired to sit up. At this time, however, a relapse took place, and the whole of the lung became involved. Oxygen was again resorted to to the extent of from 30 to 40 gallons daily, of which, however, a portion was wasted, as is necessarily the case in giving it to a child Treatment otherwise expectant and supporting. In two days the patient was considered out of danger, and thenceforth the convalescence progressed steadily.—SECOND EDITION.

the bed, pulse too frequent to be counted ; face pale and dusky, extremities cold. Within one hour after the continuous administration of the gas was resorted to, the pulse had fallen to about 160, and the respiration to 40. Within another hour the face had regained its color, *and the rales were no longer audible, unless the ear were applied to the chest.* The inhalation was continued without interruption for three hours, and irregularly for five hours longer, when it was wholly discontinued. The following day convalescence was fully established.

Dyspnœa from Cardiac Disease.—I have administered oxygen in two cases of dyspnœa from valvular disease. In the first case the patient was speechless, could scarcely be aroused ; face livid, no pulse at the wrist, whole surface cold, respiration 40 and extremely labored, pupils widely dilated and fixed. Within fifteen minutes after the administration of the gas was begun, the pulse became perceptible at the wrist, the breathing was easier, intelligence began to return, and waking from his lethargy he complained of cold, and requested more covering. At the end of an hour, the surface was warm and slightly moist, face almost natural in color, lips still blue, pupils almost normal in size and reacting to light. He answered questions intelligently, and swallowed without difficulty. Respiration 25, quite easy. Pulse 120, and of moderate strength, though small. Patient remained quite comfortable for about ten hours, when a sudden paroxysm of dyspnœa proved almost immediately fatal. Attempts were made to give the oxygen, but the extreme jactitation rendered it impossible to do so efficiently.

In the second case the dyspnœa was less severe, but the paroxysms were very much relieved, and often entirely averted, by the use of the gas.

Dr. Const. Paul reports (*Bul. Gén. de Thérap.*, tome lxxv.) a case of dyspnœa (cause not stated), which was relieved by inhalation of oxygen, after the radial pulse had ceased.

Poisoning with Opium.—The effect of opium in reducing the frequency of respiration indicates that the sensibility is so blunted that the blood requires to become unnaturally charged with carbon before the *besoin de respirer* will excite to the act of respiration. Hence the blueness of the face, and the generally asphyxiated appearance. We should suppose *a priori* that oxygen would be useful in such cases, and such has been found to be the fact. Beddoes cured a patient by its means, and M. C. Paul mentions a case in which the gas was used successfully after atropia had failed, and when the patient appeared to be dying. The respiration had fallen to 7, the pulse was very rapid and hardly perceptible, and there was a mucous rattling in the throat.—*Bul. Gén. de Thérap.*, tome lxxv.

I have administered it in two cases, in which it acted favorably, but as atropia was also given, it is difficult to say how much the oxygen contributed to the result, although the immediate effect of the gas was unmistakably beneficial.

Poisoning with Charcoal Gas.—M. Paul has been successful in a case in which the face was livid, the surface cold, the pulse very small, and the dyspnœa decided. In such a case the action of the gas is probably due chiefly to its superior displacing power for carbonic acid, in comparison with common air.

Poisoning with Chloroform.—Duroy and Ozanam show, by a number of experiments, that the effect of oxygen is antagonistic to that of chloroform, and they propose that it be used as an antidote.

Birch, on the other hand, asserts that it renders the anæsthesia deeper.

Poisoning with Chloral.—In a case of this accident, occurring recently in the practice of Dr. Jerome C. Smith, of N. Y., oxygen had a decidedly favorable effect in giving firmness and regularity to the pulse, and relieving the determination of blood to the head.—[SECOND ED.]

Cholera.—In view of the lividity of the skin, indicating imperfect aëration of the blood during the stage of collapse in cholera, and of the depression of temperature, showing decrease of molecular action, it was natural to hope that inhalations of oxygen would be beneficial, and several physicians have made trial of its use. There is a wide difference of opinion among observers as to the value of the remedy. M. De-Smyttere (*Comptes Rendus*, October, 1848), speaks of it in the highest terms. He employed it in the epidemic of 1832, in the algid stage, with "full success." He says: "A new animation and a salutary reaction follow promptly the employment of this means, which is entirely rational, and of which no one, so far as I know, has yet thought. I regard the inhalation of oxygen gas during the period of cold and prostration so dangerous in the cholera attack, and when the intestinal and cutaneous functions are profoundly perverted, as the remedy the most prompt and the most efficacious of those employed up to the present time."

Macrae, in India (1850), and Harvey, in London, (1853), also report favorable cases.

On the other hand, in the debate in the Academy, upon the paper of De Smyttere, cited above, M. Hutin stated that he had employed oxygen in numerous cases in 1835, in Africa, without a single case of success.

M. Foy also stated that he had used it in Poland, in 1831, without any special benefit.

M. St. Ange had had a similar experience, but thought that the difference in the results obtained might be referable to difference in the period in the epidemic in which the observations had been made.

(Continued in No. 6.)

LONDON CORRESPONDENCE.

LONDON, March 31st, 1874.

Since my last letter, nothing of much importance has occurred for me to write about. The dinner of which I spoke came off in due course. It was truly a goodly gathering—one hundred and seventy-four sat down to dinner. There were some half a dozen guests, but the rest were dentists, and not a few had come four or five hundred miles to be present. That, in such inclement weather, and in this country, where sleeping cars are yet in their infancy, shows that there is a bond of union springing up among us, of no insignificant strength. I hope it may gather strength, and extend three thousand miles westward. I believe it would soon be further strengthened by another bond from west to east, and then the circle would be complete. There was nothing unusual in the way in which the evening passed. The entrance of the Duchess of Edinburgh and her husband into London on the day of the dinner, made a good peg on which to hang a neat little speech, which called forth even more than ordinary expressions of loyalty. Campbell De Morgan was in the chair, and his well-deserved popularity was a substitute for any amount of eloquence. On his right was the President of the Royal College of Surgeons, Mr. Curling, and on his left Sir W. Ferguson, the veteran and gifted operator. Dr. Quain and two M. P.'s were among those present. There were some capital part songs and glees, under the direction of Mr. Irkyle, of Westminster Abbey. The grand pianoforte was lent by Messrs. Broadwood, free of charge. After this, I think you will allow that we are not standing still here.

The most amusing incident of the evening was a toast proposed by a gentleman, the health of an anonymous donor of £120 to the hospital. It is rather difficult to call forth much enthusiasm for a mere abstract, even though represented by £120, so the toast was drunk, like that of absent friends, in silence. On the whole, the event was a success, and when the usual amount of long saponis mollis had been rubbed in, to the satisfaction of everybody, the evening terminated with the orthodox coffee, and cigars for those who liked them.

I suppose the address of the President of the Odontological Society has reached you by this time, and you have formed your own opinion of it. I do not think you can find fault with its modesty, at all events. I was peculiarly attracted by an expression used in it, and have been trying to find out its meaning by thinking, but it is utterly beyond my capacity.

I once heard a parson say that it was astonishing, the amount of thought the brain could secrete. As parsons are not generally very scientific, it only seemed funny to think of the brain as a secreting gland ; but the matter secreted being called thought, was bathos such as only could come from "Coward's Castle," as a gentleman once irreverently called the pulpit.

I have read, too, in some novel, of the ringing noise in a young lady's ears being taken for the rustling of the busy thoughts of her mind. Such mistakes one may expect from young ladies, especially in a novel ; but when a physiologist, such as our President, talks of "thoughts of philosophy or religion *coursing* through a person's brain," the respectful listener begins to doubt if there be not some mental peculiarity on his part, which prevents him receiving such an accumulation of evidence on the existence of a new circulating medium. Can any of your transcen*dental* (appropriate name!) friends, favor me with an explanation? I shall feel everlastingly indebted; but it must be of a material nature, otherwise I cannot recognize it as being secreted, and rustling and coursing, as it must do if it be *thought*, according to this new view.

The last thing I shall trouble you about now, is a concert got up by the indefatigable Mr. Saunders. It was held in the Lecture Theatre of the Dental Hospital. The artists were a distinguished body of amateurs known as the Mayfair Minstrels. It was a great success in every way, and I doubt not will give a handsome lift to the building fund. Perhaps the most notable feature of the evening was a trio arranged by Kawolski (a French Pole, who I believe settled in America some three years ago), for the soprano, violin, and pianoforte—the violin being most excellently handled by a young lady who seemed rather deep in her teens yet, and so may be credited with more than ordinary promise. We had also the Bridal Chorus from Lohengrin, an opera which you are to have the benefit of in New York this season, but which has failed here at the eleventh hour, owing to the death of one of the artists, who was also the wife of the manager.

So much for dentistry and dinners, and speaking and singing, all of which are intimately dependent on each other, and so, I hope, not out of place in this gossiping letter. The transactions of the Odontological

Society are endowed with a new feature. A pathological series has been introduced, containing a descriptive account, letter-press and pictorial, of the various specimens in the museum. This is edited by Mr. C. S. Tomes, and if the first issue be taken as a sample, it ought to bring many members to the Odontological Society, if only for the sake of the Transactions. These plates and matter are stitched in the covers of the Transactions, but quite distinct from them, so that they can be bound separately.

A few more "reports" from Dr. Hitchcock, of Boston, and a volume of Tomes' Series, then surely we may say that dentistry is looking up. There is a talk of sending Mr. Sercombe's address to all the members of the profession. I think if there be any desire in them for social recognition, beyond a lazy wish, it ought to wake them up.

Your obedient servant, VAGRANT.

VIVISECTION.

By MICHAEL FOSTER, MD., F.R.S., Professor of Physiology in the University of Cambridge.

In the following pages I propose to inquire whether it is desirable that physiologists should continue the practice of what is commonly called vivisection, to which they have hitherto been accustomed. By vivisection I understand the operating with cutting instruments or by other means on the still living bodies of animals. The word "living" requires, perhaps, some further definition. In the long series of changes through which the body of a living animal passes, from full functional activity to complete decomposition, there are three chief stages, each of which may be arbitrarily taken as the end of life. There is the time at which consciousness is lost, the time at which the breath stops and the heart ceases to beat, and the time at which the muscles become rigid with the death-stiffening. The succession of the three events is always in the same order, but the interval of time between any two of them varies within very wide limits. For our purposes it will perhaps be best to take the second as marking the end of life, to say that an animal is still alive so long as the heart is beating, and air enters and issues from the chest.

It is very desirable that a discussion, the decision upon which must be of the utmost importance to physiology at least, should not be turned aside to any false issues. The question whether vivisection is a bad

thing is in no wise settled by asserting that there are many things equally bad. Thus, to say that the evil wrought upon animals in the name of science is but a flea-bite compared to that done in the name of sport, is simply to bring forward a *tu quoque* argument of no real worth, except to stop the mouths of particular opponents. When an ardent sportsman, or when one, no sportsman himself, but having a theoretical admiration of the pleasures of the field, declaims against vivisection, it may be worth while to remind such a one of some of the agonies of sport—of the scenes which accompany a *battue* or a pigeon-match ; of wounded birds dragging their maimed bodies to some hidden covert, there to die a lingering death ; of the piercing squeals of the hunted hare ; of the last moments of the brave fox, when, after a fruitless struggle, the time comes for his living body to be torn by the pursuing hounds ; to ask him how often a living object of sport is by some purposeful, sudden blow, humanely killed "to put it out of its misery ;" to suggest to him, as a matter of reflection, that, had we any satisfactory measure of pain, it would be found that all the pain which physiologists have caused, since their science began, is less than that which the animal creation have suffered in the field from the hands of the members of the two Houses of Parliament since the last general election. It may be of use to say this to a sportsman ; but vivisection is not thereby justified. It is no use saying it at all to those who are now agitating this question. They are equally opposed to cruelty in sport as to cruelty in science ; but they are also wise in their generation. They see that there is far more hope of putting down the one than the other. Biologists and physiologists are at the present moment clearly in disrepute. To call them atheists is to show one's self a man of spirit and intelligence. Following out their own science, along the path Nature has pointed out to them, they have run counter to many established opinions and cherished views. Divorced by the divergence of their respective methods in large measure from the mathematicians and physicists, to whom orthodoxy is easy, accused of materialism, active in the support of Darwinism and evolution theories, believed by the many to have no faith—their position not a little resembles that of the Jews in the middle ages ; they are just in the condition in which the accusation of cruelty is most tellingly made and most readily credited against them by a vulgar public. This the opponents of vivisection know full well ; and therefore it is against the physiologists, and not against the pigeon-shooters, that they make their complaint. They are even willing, at the present, to use the latter against the former.

By-and-by, if they are successful in this, they will move against sport, on the ground that it is far more cruel and has far less justification than the vivisection which has been done away with.

Nor is it any use to tell a far larger class, the eaters of meat, that the pain which physiology has caused since the time of Galen is far less than that which in any one week is caused in butchers' shambles in providing flesh to fill the mouths of the people of London.

Nor is it, on the other hand, any use to say that because many physiologists are kindly, humane men in private life, therefore the accusation of cruelty brought against them must be false. I know a physiologist who, after a day spent in experimental work, may be seen sitting in the evening with a favorite cat on his lap, an old dog by his side, and a new one at his feet ; but I would not therefore guarantee that he had not been cruel in the morning. He might be an angel in the bosom of his family, but a demon in the laboratory. I know a physiologist, of whom his friends have said that, had he not been so amiable, he might have made a noise in the world, and yet who, at the present moment, is being accused of brutal cruelties. I feel that the accusation might be true.

Nor is it of any use to say, though it may be said with perfect truth, that a great deal of the present agitation against vivisection is one of the many fruits of a mawkish sentimentalism which is stealing over the present generation, and by a lessening of manliness is curtailing the good effects of increased enlightenment. The foolish of this world are often used to correct the wise ; and actions brought about by a wrong sentimentalism may be in themselves right and good.

The question whether it is desirable that man should continue to inflict the pains of death, or pains without death, on other animals, and, if so, within what limits, is one which must be argued out on its own merits alone, and the discussion of it will not be advanced by irrelevant considerations such as these on which we have dwelt.

There are two aspects of the inquiry—one from the side of man, the other from the side of the animal. Let us first consider the question from the point of view of the animal.

We have to determine the principles which govern or should govern the conduct of man toward animals. One broad principle may be briefly stated : Unless man destroys animals, animals would soon destroy man. Mr. Tennyson has told us—

"Nature is one with rapine, a harm no preacher can heal ;"

and Mr. Darwin has shown that the lives of all living beings are shaped

by "the struggle for existence." Man's life is a struggle for existence with his fellow-men, with living animals and plants, and with the lifeless forces of the universe. The very conditions of his existence lay upon him the burden, and in so doing give him the right, to use the world around him, the lives of animals included, to aid him in his strife. Imagine the results of forbidding man to take away the lives of animals. Suppose, for instance, the whole human race were to form itself into a Society for the Prevention of the Destruction of Tigers. How many generations would pass before "the last man" provided a tumultuous crowd of tigers with the last human meal?—possibly the indefatigable Secretary of the Society sealing with his death his loyalty to the cause. Or, since tigers, like man, are carnivorous, and might therefore be supposed more worthy of death than herbivorous creatures, let us suppose the efforts of the Society to be directed toward the preservation of sheep. How many generations would pass before the face of the earth were covered with woolly flocks, and man were driven to lead a laborious, frugivorous, arboreal life on the tree-tops, or to earn a scanty subsistence on resuscitated *Pfahlbauten*, as being the only places where the necessities of the sheep would permit him to dwell? Did the reader ever by chance descend, at early dawn, into the kitchen, and watch the convulsive agonies of a writhing heap of cockroaches drowning in the watery trap set for them by the cook overnight? What a scene of unutterable woe is that, when judged from the stand-point of the cockroach! But, if man were to deny himself the right of vivisection or vivipression over the vermin which infest his home and bed, what would come of it?

To be serious: man, if he is to live and prosper, *must* kill other animals. It is a duty laid upon him by the nature of things; a duty, and therefore a right. Self-preservation demands it. But what do we mean by self-preservation? Can we draw a line and say that he is justified in slaying an animal for this purpose and not for that? We can only do so by applying the test of whether the death of the animal is useful to him or not. Whenever or wherever the death of an animal is of advantage either to himself or to the human society of which he is a unit, he is justified in slaying that animal.

The success of the human race in the struggle for existence depends on man's being well fed; man is therefore justified in slaying and eating a sheep. The success of the human race in the struggle for existence is dependent on knowledge being increased; man is therefore justified in slaying a frog or a rabbit, if it can be shown that human knowledge is thereby enlarged.

Death is in itself painful. It is only by special means that the pangs amid which the ties of life are loosened can be done away with. The slaughter of an animal is therefore of necessity painful, except in the special cases where means have been taken to do away with pain. In ninety-nine cases out of a hundred, when an animal is slaughtered by man, it is the death of the animal which benefits man, the pain itself which accompanies the death does him no good at all. While justified, therefore, in killing the animal, he is not justified in causing it pain. He is bound, in fact, to kill the animal in such a way as to cause as little pain as is consistent with his own interest. The death of a sheep in a butcher's slaughter-house is painful; but men cannot therefore be said to do wrong in killing a sheep for food. They kill it with as little pain as is under the circumstances possible. They could not make the pain less, except by the introduction of elaborate and costly methods, which would probably ruin the butcher or spoil the meat, or at least, in the present state of our knowledge and of the market, do damage to the interests of mankind. The death of an ox, again, is more painful than that of a sheep, but men do not therefore feel bound to live on mutton alone. They consider that the advantages of a mixed diet of beef and mutton justify them in inflicting that additional quantity of pain which is suffered whenever an ox is felled.

In short, this, under one aspect, is a selfish world. The struggle for existence is its guiding principle. If we believe that man is to govern the world, and he must either govern or succumb, then we must be prepared to use animals selfishly, if you please to call it so—to use animals for our advantage—to kill them when we have need of their deaths—to kill them with pain when the pain is for our benefit; and, inasmuch as the greater includes the less, to inflict pain without death where their pain does us good.* Our good is, in fact, the rule of our conduct toward animals. Whenever an animal is killed by man, or suffers pain at the hand of man, without benefit to man, or where the same benefit could be gained without the death or without the pain, then the death or the pain can be no longer justified. The man who inflicts them is a cruel man; he no longer does good, but harm, to humanity, and humanity ought to stop his hand.

I feel that I ought almost to apologize to the reader for having spent so much of his time over what are almost truisms; but so many absurd

*Some writers have urged that while man is perfectly justified in *killing* any number of animals, he is not justified in causing *pain*. From the point of view of the animal this is simply a grotesque absurdity; from the point of view of man we shall have to speak of it later on.

statements are continually being made, and so many whimsical ideas broached, that it seemed desirable to have a clear understanding concerning the principles which should guide our general conduct toward animals before discussing the special subject of vivisection.

We have now to inquire whether the deaths and pains which the word vivisection implies, are, or have been, wrought for the benefit of mankind, inasmuch as they have led to knowledge and power which could not otherwise have been gained; or whether they had not been wrought for the benefit of mankind, inasmuch as they have not led to knowledge and power, or the power and knowledge might have been gained in some other way, or, being gained by many deaths and much pain, have been so small that mankind could well have done without them. I introduce the word death as well as pain, because, in spite of the etymology of the word, and the fact that vivisection suggests to the public mind pain only, and not death at all, the truth is, that in at least the great majority of cases vivisection does or ought to mean death only, and not pain at all. In the minds of those ignorant of physiology—and they are foremost, if not alone, in blaming vivisection—much confusion has arisen from the different meanings attached to the words "life" and "living." I alluded to these in the beginning of this paper. To many such it is perhaps a revelation to learn that an animal may be kept alive—that is, with its heart in full working order, and its respiratory movements continuing with perfect regularity—for hours and hours after all signs of consciousness have disappeared. All operations performed on such an animal would come under the term vivisection; but, in the total absence of all signs of consciousness, it would be absurd to speak of pain. It would perhaps be a still greater revelation to such to learn that a frog, at a later stage in the series of events which we class together as death—when its brain and spinal cord have been instantaneously destroyed by an operation the pain of which may be said to be infinitesimal, and its heart removed at a time when feeling is impossible—may yet be made by proper means to kick and jump and move its body about in almost all possible ways. Any operation performed on the body of such a frog would by many be still called vivisection; but, to speak of such a mere mass of muscle and nerve as suffering pain, is about as truthful and rational as to say that it is cruel to cut down a tree, though a silly, ignorant looker-on might shriek when the leg moved, for about the same cause and with the same reason that the African grovels before his fetich.

Did the reader ever see a rabbit completely under the influence of

chloral? Lying prostrate, with flaccid limbs, with head sunk back on the limp neck, motionless and still, at first sight it seems quite dead and gone. But a gentle heaving of the body, a rise and a fall every few seconds, tells you that it still breathes; and a finger placed on the chest may feel the quick throb of the still beating heart. You pull it and pinch it; it does not move. You prick with a needle the exquisitely-sensitive cornea of its eye; it makes no sign, save only perhaps a wink. You make a great cut through its skin with a sharp knife; it does not wince. You handle, and divide, and pinch nerves which, in ourselves, are full of feeling; it gives no sign of pain. Yet it is full of action. To the physiologist, its body, though poor in what the vulgar call life, is still the stage of manifold events, and each event a problem, with a crowd of still harder problems at its back. He therefore brings to bear on this breathing, pulsating, but otherwise quiescent frame, the instruments which are the tools of his research. He takes deft tracings of the ebb and flow of blood in the widening and narrowing vessels; he measures the time and the force of each throb of the heart, while by light galvanic touches he stirs this part or quiets that; he takes note of the rise and fall of the chest-walls, as they quicken or grow slow, as they wax or wane, under this influence or that; he gathers the juice which pours from one or another gland; he divides this nerve, he stimulates that, and marks the result of each; he brings subtle poisons to bear on the whole frame, or on parts; and, having done what he wished to do, having obtained, in the shape of careful notes or delicate tracings, answers to the questions he wished to put, he finishes a painless death by the removal of all the blood from the body, or by any other means that best suit him at the time. I am not exaggerating when I say that this is at the present day one of the commonest forms of vivisectional experiment; this is what newspaper writers speak of as "torture," and, on the strength of it, accuse cultivated physiologists of barbaric cruelty.

A dog under chloroform or morphia may be brought to very nearly the same condition as a rabbit under chloral; but, as far as my experience goes, the same long duration of complete quiescence is maintained with greater difficulty. Dogs sometimes howl under chloroform or morphia when nothing is being done to them, and under circumstances in which they can be suffering no pain. At the moment when the chloroform begins to take effect upon them, when probably confused carnivorous visions chase through their brains, the howling is often excessive. Any one who knows anything about the administration of

chloroform to human beings, is well aware how frequent cries and noises are in the stage of excitement, and how little dependence can be placed on them as signs of pain.

In a large number of cases, then, where anæsthetics of one kind or another are used, vivisectional experiments cause no pain at all ; and as far as I know, in this country, at least, physiologists always use anæsthetics where they can. They do so not only for the sake of the animal, but also for the sake of the experiment itself. Unless they are studying actual manifestations of feeling, pain, with all its consequences, is a disturbing element which must by all possible means be eliminated, if the experiment is to have its due value. The apparent lifelessness of the animal is the physiologist's opportunity ; struggling limbs would utterly defeat his aims, and a sudden start might wreck his whole experiment. Chloroform and other anæsthetics have immensely lessened human suffering, not only by simply diminishing pain, but even still more by putting it in the power of the surgeon to perform operations which he otherwise would not dare to attempt. In the same way they have powerfully aided the progress of physiology, by rendering possible new experiments, and by allowing the investigator to analyze securely phenomena which otherwise would, perhaps forever, have remained confused through the disturbances caused by pain.

There are some experiments, however, requiring vivisection, in which the use of chloral or other anæsthetics is, for various reasons, inadmissible or undesirable. These form two classes. In the first and most numerous, the experiment is generally a short one, and quickly carried out, and the pain slight and transient. It is, of course, impossible for any one to judge truly of the pain felt by any other body, and we may err in two ways in estimating the pain felt by animals. We may overestimate or under-estimate it. Perhaps a rough but tolerably safe test of great pain or distress may be gained by noting whether the animal is willing to eat or not. When a rabbit, for instance, not previously starved, begins to munch carrots immediately after an operation, or even continues to munch during the greater part of the time the operation is being performed, it is only fair to conclude that the operation cannot be very painful. I may add that, in the experience of experimental physiologists, the skin of the dog and the rabbit—allowance being made for individual peculiarities—is not nearly so sensitive as the human skin.

(*To be continued.*)

ALUMINUM.

Aluminum possesses the following remarkable properties It is of white color, resembling silver, and is very sonorous ; more so than any other metal. It is the lightest metal, having a specific gravity of 2·5 (while silver has a specific gravity of 10·53) ; this property renders aluminum very valuable in the arts, such as for making small weights used in chemical analysis, for dentists in the manufacture of plates for artificial teeth, and many ornamental purposes, particularly as it resists so well the action of a moist atmosphere. It even resists boiling nitric acid ; this property puts it on equality with gold and platinum ; but hydrochloric acid attacks it. It is, however, not blackened by hydrosulphuric acid. It is infusible in cast iron heat by exclusion of air, but burns in the same with brilliancy, and in oxygen gas the combustion is so fierce that the eye can hardly bear to look on it ; it is then formed into the earth alumina. It dissolves readily in dilute caustic alkali, such as ammonia, and in dilute sulphuric acid ; it is not attacked by cold sulphuric or nitric acid.

Aluminum bronze is an alloy of 1 part aluminum and 9 parts metallic copper. It has the color of gold, but becomes dull after a while, and it is as strong as iron ; neither mercury nor lead, both of which generally attack other metals, has any effect on aluminum.

ALUMINA.

It has been remarked that alumina is found in nature almost pure in the sapphire, corundum, emery, spinelle, topaz, diaspore, in the vast deposits of clay, and in all silicated minerals. In order to obtain the same pure and in a hydrate, the following process is adopted : Commercial alum, free from iron, is precipitated by a concentrated solution of carbonate of soda in excess ; the precipitate is redissolved in hydrochloric acid, and again precipitated by ammonia ; this precipitate is then calcined, and the result is a pure hydrate of alumina. A more simple method is by igniting the pure ammonio-alum, also by the decomposition of a solution of alum and chloride of barium. The pure alumina is colorless and tasteless, and wholly insoluble in water. If a little alum is dissolved in warm water, and some ammonia is added to the solution, the latter combines with the sulphuric acid, while the alumina unites with water so as to form a semi-transparent gelatinous mass, which is the hydrate of alumina ; this has a great affinity for many coloring matters, forming the well-known lake pigments.

[*Dr. L. Feuchtwanger.*

ANILINE COLORS.

Professor Kopp, who has recently made a careful study of the aniline colors of the Vienna Exposition, says that the manufacture of these pigments from coal tar products is making most remarkable progress. Fuchsin, constituted by a salt of rosanilin, is obtained exclusively by the reaction of arsenic acid on commercial aniline. In order to afford an idea of the enormous consumption of this violent poison in the manufacture of fuchsin, it is stated that in Germany alone the same is estimated at 3,300,000 pounds a year. It is only lately that the residues have been treated to regain the arsenic in commercial form. M. Kopp mentions as a novelty a beautiful rose-red coloring matter called saffronin, which upon silk is a very brilliant dye.

HOW TO KEEP A SITUATION.

An observing correspondent in the *Western Rural* gives the following hints on the above subject:

Be ready to throw in an odd half hour or an hour's time when it will be an accommodation, and don't seem to make a merit of it. Do it heartily. Though not a word be said, your employer will make a note of it. Make yourself indispensable to him, and he will lose many of the opposite kind before he will part with you.

Those young men who watch the clock to see the very second their working hour is up—who leave, no matter what state the work may be in, at precisely the instant—who calculate the extra amount they can slight their work, and yet not get reproved—who are lavish of their employers' goods—will always be the first to receive notice, when times are dull, that their services are no longer required.

LAUGH AND BE HEALTHY.

The physiological benefit of laughter is explained by Dr. E. Hecker in the *Archiv fur Psychiatrie.* The comic-like tickling causes a reflex action of the sympathetic nerve, by which the caliber of the vascular portions of the system is diminished, and their nervous power increased. The average pressure of the cerebral vessels on the brain substance is thus decreased, and this is compensated for by the forced expiration of laughter, and the larger amount of blood thus called to the lungs. We always feel good when we laugh, but until now we never knew the scientific reason why.—*Scientific American.*

NOTES.

Prize Essay on Rubber Dam and Its Uses.

The committee appointed to examine essays on "Rubber Dam and its Uses," which originally consisted of Drs. S. C. Barnum, A. L. Northrop and W. A. Bronson, with our consent added to their number Drs. J. T. Metcalf and F. M. Odell.

April 15th they reported in favor of the essay signed "Qui docet, discet." We at once forwarded the envelope bearing this *nom de plume* to the president of the committee, who opened it, and informed us that the essay was written by Dr. H. S. Baylis, to whom we offer our congratulations, and to whom we shall take pleasure in forwarding an Improved Morrison Engine—if he so elect—when they are ready for delivery from our factory.

Dr. Baylis' essay is the first article of this issue. Other essays on this subject are worthy of publication, and will appear in our pages under the assumed name used by the authors.

Johnston Bros.

The Maryland Dental College.

FIRST ANNUAL COMMENCEMENT.

The first annual commencement of this institution was celebrated in Masonic Temple March 4th, in the presence of a large and apparently very deeply interested audience. At 8 o'clock the Board of Regents, the Dean, and members of the faculty and the graduating class took their places upon the platform.

The Rev. J. H. Lightbourn, of Charles Street M. E. Church, offered prayer, after which the Dean of the Faculty announced the names of the graduating class.

This was followed by the "Autograph Waltz" by the orchestra.

Mr. Cornelious T. Hurlbut, D.D.S., of Springfield, Massachusetts, then proceeded to confer the degrees, prefacing the duty by an address to the members of the graduating class. As each gentleman was called, he came forward to receive the document which officially declared him to be a

DOCTOR OF DENTAL SURGERY.

As each gentleman received his parchment the Floral Committee loaded him down with bouquets of natural flowers. Indeed, the flowers were so plentiful that in some cases the graduates were unable to carry them away. The following are the names of the members of the graduating class :

Lafayette Adreon, of Maryland ; Geo. W. Carpenter, Maryland ; T. W. Coyle, Maryland ; Llewelyn Crother, Maryland ; Charles E. Duck, Maryland ; William B. Finney, Virginia ; Fred. A. Levy, Virginia ; William S. McDowell, Maryland ; W. S. Norris, Maryland ; J. Emory Scott, Maryland.

The valedictory address was then delivered by the Rev. S. D. Noyes, of Green Street Presbyterian Church. He said that he felt greatly honored when invited by the Dean to deliver the valedictory address at the first annual commencement of the Maryland Dental College. He said that to most persons study and science appeared dry and uninviting, but the reward was a hundred times greater than the trouble, and no young man who once entered upon a course of study, and devoted himself to it patiently, failed to feel eventually that he had been amply repaid for all his labor. He spoke of the prejudice that existed in the minds of many in regard to dentists, and attributed this feeling to the great number of impostors who had gained a livelihood before the

foundation of dental colleges, by traveling over the country and practicing their quackery. The speaker said that within the last few years the science of dentistry had been greatly advanced by physiological and anatomical researches, and now a dentist must not only be able to extract a tooth, but he must know why it was best to do so, and to what extent the operation affected the other parts of the body. In 1839 Maryland took the lead in dentistry, and established a dental college, and for some years that college had struggled through a sea of bad feeling and oppression ; but it had finally triumphed, and was now one of the leading institutions of the country. The speaker paid a high tribute to the Maryland Dental College and its Board of Regents, and dwelt upon the thorough character of the examination each of the graduates were compelled to pass through before receiving their diplomas. The speaker then specially addressed himself to the members of the graduating class, and urged them to not only aim to be good dentists, but to aim at moral worth, so as to become good men as well as good dentists.

A short and very interesting address was then delivered on behalf of the class by Mr. Fred A. Levy, which was frequently applauded. The exercises were concluded with the benediction, pronounced by Dr. Lightbourn.

The following are the Regents of the College : Prof. Nathan R. Smith, M.D. ; Rev. Richard Fuller, D.D. ; Rev. L. F. Morgan, D.D. ; Chief Justice George William Brown ; Col. Charles Marshall, Baltimore, Md. ; Hon. Edwin H. Webster, Belair, Hartford county, Md. ; Thomas B. Gunning, M.D., D.D.S., New York city ; R. Finley Hunt, D.D.S., Washington city ; B. F. Arrington, M.D., D.D.S., Raleigh, N. C. ; J. G. Wayt, D.D.S., Richmond, Va. ; James Johnston, M.D., Staunton, Va. ; Cornelious T. Hurlburt, D.D.S., Springfield, Mass. ; George H. Fouke, D. D. S., Westminster, Md. ; George W. Neidich, D D.S., Carlisle, Penn. ; J. R. Walker, D.D.S., New Orleans, La. ; J. C. Storey, M.D., D.D.S., Eutaw, Green county, Ala. ; W. W. H. Thackston, M.D., D.D.S., Farmville, Va. ; James F. Thompson, M.D., D.D.S., Fredericksburg, Va. ; H. A. Lawrence, D.D.S., Athens, Ga.

The members of the Faculty are : Samuel H. Williams, D.D.S., Emeritus Professor of the Institutes of Dentistry ; Byron F. Coy, D.D.S., Professor Dental Surgery ; Henry H. Keech, M.D., D.D.S., Professor of Pathology and Therapeutics ; M. Whilldin Foster, D.D.S., Professor of Dental Mechanism and Metallurgy ; Edward P. Keech, D.D.S., Professor of Clinical Dentistry ; Richard B. Winder, M.D., D.D.S., Professor of Physiology and Hygiene ; Samuel M. Field, D.D.S., Professor of Chemistry and Dental Materia Medica ; L. McLane Tiffany, B.A., M.D., Professor of Comparative Microscopic and General Anatomy ; A. P. Gore, D.D.S., Adjunct Professor of Clinical Dentistry ; C. T. Brockett, D.D.S., Demonstrator of Practical Dentistry ; H. G. Ulrich, D.D.S., Demonstrator of Practical Dentistry ; B. W. Barton, M.D., Demonstrator of Anatomy.

Dr. Barnum's Rubber Dam.

We were glad to find Mr. Sercombe, in his inaugural address, calling attention to the claims of Dr. Barnum upon the profession in this country for his valuable invention of the Rubber Dam. We brought the matter under the notice of the readers of this Journal some months ago, and we shall be very glad if Mr. Sercombe signalizes his year of office by obtaining from the Dental Surgeons of Great Britain some tangible evidence of their appreciation of Dr. Barnum's invention.

[*Monthly Review of Dental Surgery.*

Illinois State Dental Society.

The tenth annual session of the Illinois State Dental Society will be held at Jacksonville on the 12th day of May (Tuesday), at 10 o'clock, A.M. All dentists are cordially invited to be present.

Very respectfully, &c.,
CHARLES E. KOCH,
Secretary Ill. S. D. S.

Chicago Dental Society.

At the annual meeting of the Chicago Dental Soeiety, held April 5th, 1874, the following officers were elected for the ensuing year:

President.............Dr. E. D. SWAIN
First Vice-President..Dr. C. R. E. KOCH
Second " " .Dr. G. W. NICHOLS
Corresponding Secretary.Dr. J. L. CLAPP
Recording Secretary.Dr. D. B. FREEMAN
Treasurer........Dr. GEO. H. CUSHING
Librarian...........Dr. C. R. E. KOCH
Executive Committee........ Dr. M. S. DEAN, Dr. A. W. HARLAN, Dr. J. N. CROUSE

J. L. CLAPP, *Cor. Secretary.*

Dental School of Harvard University.

Report of dental cases treated at the Massachusetts General Hospital, Dental School of Harvard University, for the quarter ending March 31st, 1874.

OPERATIVE DEPARTMENT.

Number of new patients	1238
" " old "	827
Total attendance	2065

Men, 234; Women, 793; Children (under 14 years), 211.

American, 819; Foreign, 419.

Residents of Boston, 909; Residents of other places, 329.

Number of prescriptions given, 21; number patients having teeth extracted, 428; teeth extracted, 728.

Number of patients having teeth filled, 600; teeth filled, 764.

Number of unclassified operations, 286.

MECHANICAL DEPARTMENT.

20 teeth mounted on.....	5 gold plates
25 " " ".....	6 silver "
208 " " ".....	19 Vul. "
253 " " ".....	30 plates

7 repair cases (6 on vulcanite, 1 on silver).

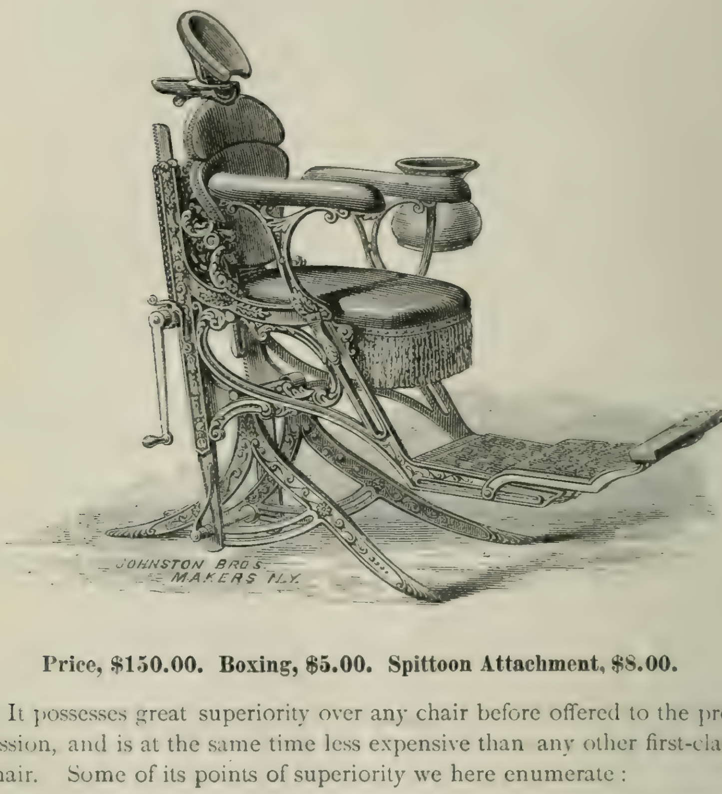
2 artificial palates.

C. WILSON, D.M.D.,
Dentist to Mass. Gen. Hospital.

Inherited Diseases.

Dr. Brown Sequard, according to the late Professor Agassiz, discovered, in the course of his investigations upon the causes of epilepsy, that he could artificially produce this affection in guinea-pigs at his pleasure. Professor Agassiz said that Dr. Sequard had made more experiments among animals than any man living, continuing them upon successive generations, and ascertaining what diseases may be transmitted; and he has stated facts, some of which almost defy belief. Those facts are unpublished. A few of them are given. The disease of epilepsy can be induced in those animals by certain operations, and this disease, being so introduced into the system, may be transmitted from generation to generation, and thus become hereditary. Where such operations have produced malformations of the skin, as is often the case, these also have been transmitted; or where the pores have been affected by such operations, a peculiarity has been also transmitted. Malformation produced by these experiments as a disease during the life of a parent, has been passed down to the offspring, and even habits arising from disease have been inherited in the same way. These facts have a fearful significance.—*Manufacturer and Builder*

THE
Morrison Dental Chair.



Price, $150.00. Boxing, $5.00. Spittoon Attachment, $8.00.

It possesses great superiority over any chair before offered to the profession, and is at the same time less expensive than any other first-class chair. Some of its points of superiority we here enumerate :

1st. All the advantages of any low-based chair, and also of any high-based chair, are here secured in a single chair. In it the patient can be placed lower than in the lowest-based chair made, or higher than in any other of which we have knowledge. At its lowest position the seat is fifteen inches, and at its highest position forty-two inches above the floor.

2d. The operator using the Morrison Chair can either stand or sit at his work, as he may choose, working with equal convenience in either position.

3d. It has been a very general complaint that dental chairs are too wide at the back, so holding the operator away from his work. Here this difficulty is overcome. The chair is narrow at the back, so that the operator need not stretch to reach the patient, but *can lower either arm of the chair out of the way* and so be as near the patient as he may choose.

4th. It can be changed from its lowest to its highest position in seven seconds—a celerity impossible in any chair raised by a screw.

5th. It can be very readily and perfectly adapted to operations on children of any age

First. Because in it the child can be raised as high as needed for the tallest operator.

Second. It provides a comfortable back and head rest, exactly as for grown persons.

Third. The footstool can be lengthened or shortened, to suit children of any size.

6th. The back of the chair can be lengthened or shortened rapidly and at will.

7th. The lower part of the back can be thrown forward to support the small of the patient's back.

8th. The chair, when adjusted to any position, is firm or steady wherever placed, and this is *especially true of the head-rest.*

9th. It occupies less room than any other operating chair.

10th. Although the footstool, when at its extreme length, is much longer than any other made, yet a person of ordinary weight can stand on its extremity without tipping the chair.

Nota Bene.—We have substituted brass cogs and castings, for those that experience has shown in any degree faulty, and the chair, *as now sold, is as strong as any chair made.* Reference is made to this because several of the chairs first sent out, failed in the cogs by which the chair is raised, and in the castings which throw the lower back-pad forward. These have been replaced in every instance with brass cogs, without charge on our part, and to the complete satisfaction of the purchaser.

We are gratified in being able to refer to the commendations, which follow, from some of the leading practitioners of the country.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

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10 W. 11*th St., New York, July* 24*th*, 1873.

MESSRS. JOHNSTON BROS., Broadway :

I find your Morrison Chair gives great satisfaction. My patients all admire, and voluntarily pronounce it the easiest they ever sat in. The movable back-piece, arms and foot-rest, which latter the patients can adjust at pleasure without changing their position, the lowering of the whole chair, which admits stepping into it without the slightest inconvenience, are points which call forth immediate praise from the patients, and give great satisfaction to the operator.

As a child's chair it is invaluable ; the little patients can be " put just where you want them," while the operator can with ease change the position of the *whole* chair, without disturbing the patient in the least. These points, combined with others which it has, make this chair the most desirable of any which I have seen. Very respectfully yours, A. L. NORTHROP.

JOHNSTON BROS., *Hartford, June,* 15*th,* 1873.

GENTLEMEN : I have used the new Morrison Chair several hours every day since its arrival here, and feel in duty bound to say that there is no chair manufactured that can compare with it.

Its adaptability to children as well as adults, support for the small of the back—in fact, all its motions are perfect, and I see no chance for improvement. Dr. Morrison and yourselves have my heartfelt thanks for the great benefits you have conferred upon the profession in perfecting the chair as well as the Dental Engine. Very truly yours, GEO. L. PARMELE, M.D., D.M.D.

MESSRS. JOHNSTON BROS., *Hartford, July* 24*th,* 1873.

DEAR SIRS : The Morrison Chair meets all my expectations. I like it very much ; in fact, I feel perfectly satisfied that I have one of the most complete chairs yet made for the comfort of patients and the convenience of the operator.

Yours truly, JAS. McMANUS.

IMPROVED

Morrison Dental Engine.

The cut on the following page well illustrates the new Engine, and, with the subjoined description, will make the alterations plain to all. While still disappointed in being unable to fill orders for them, we are so nearly ready that no considerable further delay in filling orders can ensue. We are doing all that can be done consistent with thorough workmanship to hasten the manufacture of both this and the Suspension, or Elliott Dental Engine.

DESCRIPTION.

1st. The rocking movement of the upright standard is abandoned, and a rigid, handsomely plated, and tapering column substituted.

2d. From the top of this column extends an arm directly in front of the patient. This arm swivels upon the column, and is adjustable vertically, being secured by a brace at any height desired, thus bringing its end directly in front of the patient's mouth, whatever be the height of the operating chair.

3d. Attached to the end of the adjustable arm by a most ingenious universal joint, is a shaft about twelve inches long (corresponding to the extension arm of the old engine), which carries at its end the handpiece.

- *a.* This shaft, being short, is much lighter than the old one, enabling the operator more perfectly to feel his work, and is also less liable to tremor.
- *b.* Both sides of the mouth may be reached without changing the position of the engine.
- *c.* By lowering or raising the adjustable arm, according as the operation is upon the superior or inferior teeth, the driving spring is but slightly flexed, and great steadiness secured.

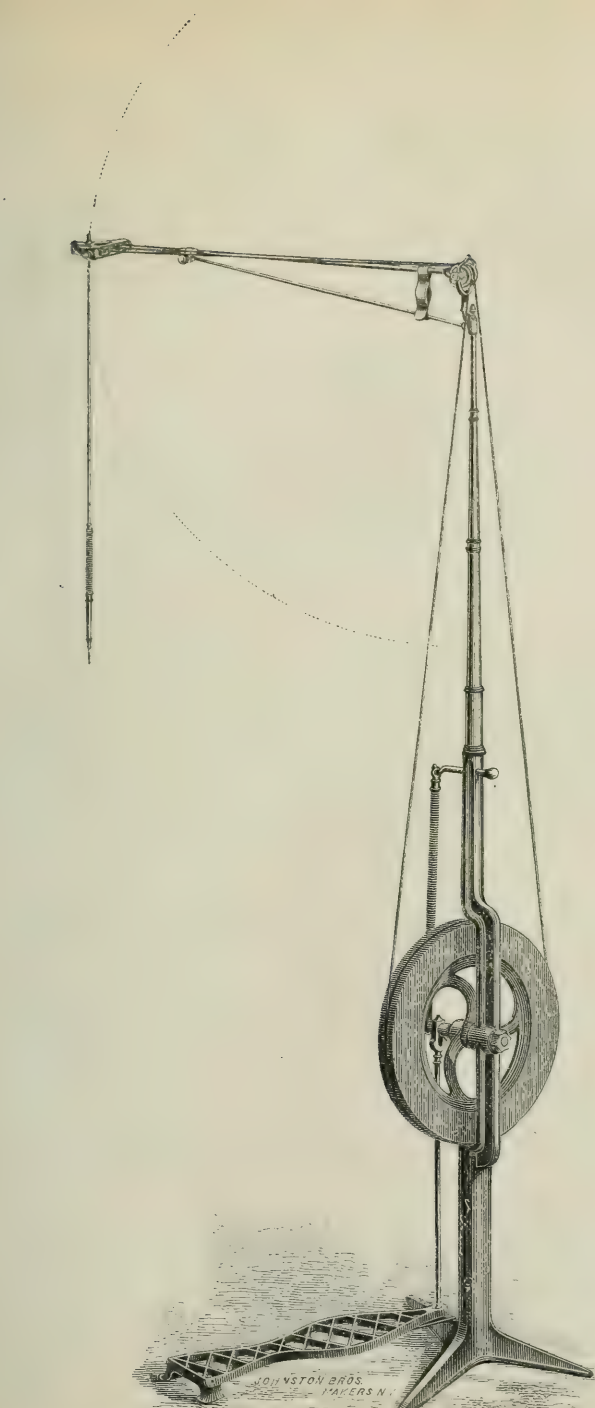
4th. The off-centre spring is attached above the driving wheel, partially supporting it and reducing the friction.

5th. The handpiece is much smaller, and the burs so secured that they may revolve in either direction, and at the same time be used either with a pushing or pulling cut, and this without the use of a catch spring. Old style burs can be refitted to this handpiece.

6th. An improved "right angle," capable of doing duty at several other angles, will be illustrated in our May issue.

The model engine of this pattern, as above described, has been for several weeks in use in the hands of one of the best operators in our city, and is pronounced by him a very decided improvement.

JOHNSTON BROS.

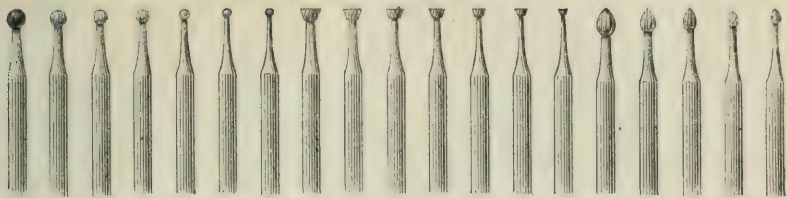


IMPROVED MORRISON ENGINE.

Price, $60. Attachment Extra.

CAVITY INSTRUMENTS.

ROUND. INVERTED CONE. BUD SHAPED.



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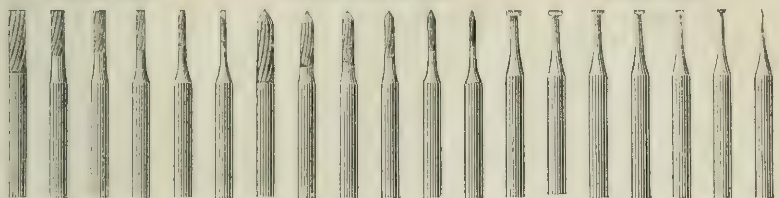
FISSURE BURS. POINTED FISSURE BURS. WHEEL BURS.



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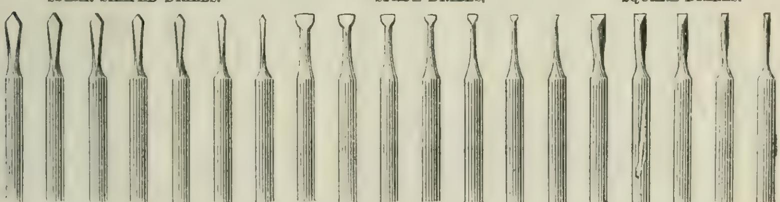
SPEAR SHAPED DRILLS. SPADE DRILLS. SQUARE DRILLS.



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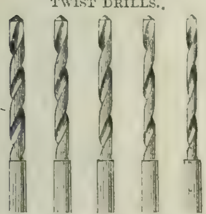
TWIST DRILLS.



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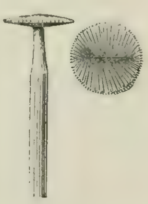


Price, $1.25.

CAVITY INSTRUMENTS FOR RIGHT ANGLE ATTACHMENT.

We have in stock, and can furnish *Cavity Instruments* for the *Right Angle Attachment*, of all styles and sizes, from Nos. 100 to 218, inclusive.

SCOTCH STONES, MOUNTED.

The Scotch Stones enable the operator to give a finish to fillings hitherto unattainable, and only need a trial to be appreciated. We have these in stock of forms Nos. 75, 77, 80 and round. Other kinds of stones are now in process of manufacture.

HINDOOSTAN STONES, MOUNTED.

Forms of Nos. 75, 77, 80, and round. Of each shape we make three sizes. The cuts referred to by the numbers represent the large size. These are, beyond doubt, of the greatest utility in cutting either gold or bone. They last longer than any other stone.

LEATHERS, MOUNTED.

We have in stock Leather Points mounted on Mandrils, of forms Nos. 75, 77, 80 and round, designed to be charged with powders, for polishing and finishing fillings.

Screw Mandril. to be armed with leather, wood, etc., for polishing fillings, cleaning teeth, finishing plates, etc.

PRICES.

Finishing Burs,	Per dozen,	$6 00
Stoned Finishing Burs,	Each,	1 00
Cavity Instruments and Screw Mandril,	Per dozen,	3 00
Stoned Cavity Burs,	Each,	50
Right Angle Cavity Instruments,	Per dozen,	3 00
Leathers, Mounted,	"	3 00
Hindoostan Stones, Mounted,	"	6 00
Scotch Stones, Mounted,	"	3 60
Burnishers,	"	9 00
"	Each,	0 75
Corundum Points, Mounted,	Per dozen,	1 50
" " not Mounted.	"	0 75
Bands for Engine,	"	1 50
Twist Drills	Each,	40

IN ORDERING INSTRUMENTS DESIGNATE THEM BY THEIR NUMBERS, AND STATE WHETHER THEY ARE WANTED TO FIT THE OLD OR NEW STYLE HAND PIECE.

Especial attention is called to our burnishers. They have been most cordially endorsed by our most prominent operators.

Purchasers of the new style improved hand piece will have all of their old stock of burs fitted to the new hand piece, free of charge, by sending them to us either by mail or express.

☞ Our instruments are all made of the best Stubs' steel. We shall spare no effort to make them equal in every respect to anything offered to the profession.

☞ We are constantly adding new forms and sizes of Plug Finishing Burs, Cavity Instruments, Drills, etc.

DIRECTIONS FOR USING THE ENGINE.

1. In lifting the engine, be sure *not to bend* the arm which carries the hand piece.

2. Whenever the least noise is heard, oil the engine with the best sperm oil. The rapidity of motion renders oil a necessity.

3. The only part at all likely to break, is the small spring, which conveys power at the upper end of the hand piece. It is not soldered to the shaft, but is slipped on by hand. To put on a new spring, take hold of it near the end opposite that you apply to the shaft, and twist as if to *uncoil* the spring, at the same time pushing the spring on to the shaft. You will be greatly aided in removing the broken parts, by twisting, as if to uncoil, the spring. A piece of emory paper will be found convenient to aid in holding the polished shaft.

4. The engine, to run satisfactorily, should be oiled daily ; and the driving-spring should be perfectly straight.

IMPROVED INSTRUMENTS.

We have added to our list three new and very popular sizes of Cavity Burs. One round called 106½, one inverted cone called 113½, one wheel-shaped called 137½. Each is smaller than any before made by us, of its shape. These numbers are neatly put up in dozen and half dozen packages, and are completely protected from oxidation and from rubbing against each other in transportation.

They are very popular, and we frequently receive orders from dentists for from one to three dozen of each.

STONED BURS FOR BURRING ENGINES.—For some time past, we have made to order, a Bur for use in Burring Engines, by the following process: The teeth of the Bur being laid out with extreme accuracy, are filed to *exactly the same length*, but are not brought to a cutting edge. The Bur is now tempered, and each tooth *afterwards stoned to a fine edge*. This secures a Bur perfect in all its cutting edges, and unequaled by anything hitherto offered in the market. Of these we are provided with a limited supply, of both Cavity and Finishing Burs, excepting Fissure *Burs*. (See Price List.)

Thin Boxwood Discs for carrying Polishing Powder, to polish fillings in proximal cavities. These are of four sizes, from ⅜ inch to 1 inch diameter.

We add that the Instrument-stand, elsewhere illustrated, will be found very useful for the convenient keeping of the Engine Instruments while not in actual use.

Besides the form represented in the cut, we have them with smaller holes, and very many more of them, so that each Bur may be kept by itself.

We invite the fullest examination of our Engine Instruments, as regards

The quality of the steel from which they are made.

The shape and finish of the cutting edge.

Their temper.

The rapidity with which they cut.

Their durability.

The shaft of each instrument is *round and highly finished*, and can therefore be used without unreasonable and unnecessary injury to the nose of the hand-piece, which injury occasions unsteadiness in all the uses of the Engine.

They will *bear* examination in *quality* and *price*.

JOHNSTON BROS.

INSTRUMENT STAND FOR ENGINE BURS.

Price, $2.50.

No. 1 as above. No. 2 with many more, but smaller holes.

This is made of rosewood and maple in alternate layers, and is very ornamental. Besides the form shown above, we have another like this in all respects except that the holes into which the burs are placed are made so small as to hold only one or two instruments in each. We call this No. 2.

JOHNSTON BROS.

CARVACROL. C.^{20} H.^{14} O.^{2}

HIGHLY RECOMMENDED.

PROPERTIES:—Locally applied, Carvacrol, in full strength or diluted, seems to possess antiseptic, disinfectant, sedative, mildly caustic and escharotic, gently styptic, stimulant, irritant and rubefacient properties.

Carvacrol, as a substitute for Glycerole of Thymol and Creosote or Carbolic Acid, in cases of Odontalgia, Sensitive Dentine, Alveolar Abscess, "Canker Patches," etc., may be locally employed in the same manner.

As a gargle for Tonsillitis and inflamed mucous membranes, it may be employed in the proportion of about three drops to the ounce of water, or the strength can be increased when more powerful action is required.

Price per Bottle, $1.00.

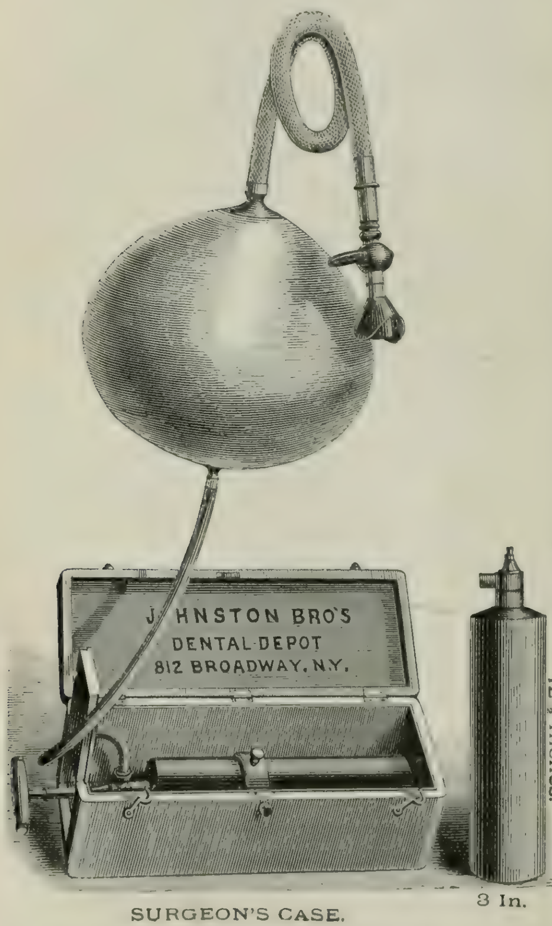
H. L. SAGE, D.D.S.

For Sale by JOHNSTON BROS.

LIQUID NITROUS OXIDE.

[Revised Circular.]

The increased and still increasing demand for Pure Liquid Nitrous Oxide, and for information concerning apparatus for its exhibition, renders it necessary that we issue yet another edition of our circular upon that subject As the Surgeon's Case, as first introduced, has proved itself in every way all that we could wish it to be for the place assigned to it, we cannot do better than to repeat here our first description of it.



SURGEON'S CASE.

This comprises a strong cylinder containing One Hundred Gallons of Gas; a strong morocco covered case, provided with an iron ring and set screw, by which the iron cylinder is held in place during use, and its delicate valve protected from injury; also, a rubber bag with rubber tube at one end for admission of gas, while an inhaling tube, handsomely covered on its outside, and provided against any possibility of a collapse by a tin-coated spiral of wire on its inside, is fastened at its opposite end—an inhaler—a nickel-plated wrench and a nickel-plated key. In fact, *all* the apparatus necessary for administering the gas. The whole case and contents weighs about fifteen pounds. This is here shown as open, and the bag which receives the gas from the cylinder, and from which it is exhibited to the patient, is represented as filled, and suspended above the case. The cylinder is also shown as standing at the side of the case. This is the simplest and most popular form of apparatus, and will be everywhere welcomed—because of its portability for use outside of the operating room.

The first letters of recommendation we published are of so cheerful and enthusiastic a character, that we cannot feel satisfied to lay them aside. We, however, add a few of more recent date. The more we examine the statistics of anæsthetics, the more thoroughly are we convinced that whether we would suit the real interest of either surgeon, dentist or patient, no other anæsthetic should be used.

One single argument in favor of Chloroform and Ether over Nitrous Oxide can be adduced—they are cheaper.

Per Contra—examine the evidence below.

From a careful examination of the statistics of 200,893 cases, Prof. E. Andrews gives, in the *Chicago Medical Examiner*, the following estimate of the relative danger from different anæsthetics:

Sulphuric Ether	1	death to	23,204	administrations.
Chloroform	1	"	2,723	"
Mixed Chloroform and Ether	1	"	5,588	"
Bi-chloride of Methylene	1	"	7,000	"
NITROUS OXIDE	**no**	**Deaths in**	**75,000**	"

[*Dental Cosmos.*

Edward R. Squibb, M.D., than whom our country has no more able pharmaceutist and toxicologist, in a lecture on anæsthetics before the Medical Society of the State of New York, says: "Nitrous Oxide was the first anæsthetic; and the safety and certainty of its effects, even in inexperienced hands, for all momentary operations, and the promptness with which persons recover from its use, render it perhaps the most important of all anæsthetics, because destined to relieve a greater aggregate amount of pain, *with greater safety*, than any other agent."

Again—"If the surgeon considers the safety and saving of pain to his patient first, and his own convenience in operating, second, he will hesitate before passing over such an agent as Nitrous Oxide."

It may be well just here to call attention to the fact that, when ether or chloroform is administered, it is not at all uncommon for the air about the patient to become so charged with the vapor as to somewhat affect the surgeon, taking from him perfect clearness of mental operation, and of the senses, and frequently leaving him with headache, and even nausea.

When Nitrous Oxide is given, nothing of this occurs, and the surgeon is in no way conscious of the presence of the anæsthetic, except as he sees its effects on his patient. This, we think, is a convenience to the surgeon.

Numerous and repeated trials of the Liquid Nitrous Oxide in capital operations in surgery, (as well as in momentary operations), during the two years just passed, attest the perfect adaptability of this agent to all cases where an anæsthetic is needed, and the time will not be very distant when it must supplant the use of its cheaper, but dangerous rivals.

Why Nitrous Oxide should be preferred to Ether or Chloroform.

1*st.* It is far safer—see statistics above. Dr. Colton reports having administered it to thousands of patients, without a single accident.

2*d.* It acts quickly: from one to two minutes being generally sufficient to bring a person completely under its influence.

3*d*. It seldom excites a patient to violence—a matter of great importance.

4*th*. Nausea is not often excited, even during a long operation. Eating, however, should not immediately precede the administration of the gas. It is contended by some operators of large experience, that *pure* nitrous oxide *never* causes nausea. In operations of the eye, or in the pelvic region, this peculiarity renders the gas invaluable, and it always is of much value to the patient's feelings.

5*th*. The shock given to the system by other anæsthetics, is almost as severe as the operation itself, and a slow return to consciousness and the normal condition detrimental to the recovery of the patient. Nitrous Oxide frees itself from the system as speedily as it produces its effects, and so adds nothing to the perils of surgery.

6*th*. It is no small advantage, as before recited, that, while using Nitrous Oxide, the operator feels no inconvenience from its effects, as he does not inhale it, while he cannot altogether escape the fumes of ether or chloroform.

We append a few Letters and Extracts from Letters received from those who have tried the apparatus.

JOHNSTON BROS. *New York, October* 13, 1871.

MY DEAR SIRS:—This afternoon I used the LIQUID NITROUS OXIDE you sent me, in an operation by Dr. J. Marion Sims, in presence of Drs. J. C. Nott, Walker and Nicoll. I have produced anæsthesia rapidly, and *kept it up for fifty* (50) *minutes without intermission*, to the great delight of us all. This is probably the first time in America (possibly in the world) that anæsthesia has been kept up for this length of time with Liquid Nitrous Oxide Gas. I expect to use it again in a few days, in a case of ovariotomy. Please send me a charged cylinder and face-piece. Yours truly,

D. H. GOODWILLIE.

Extract from Letter of Dr. J. Marion Sims.

267 *Madison Avenue, New York, Jan* 25, 1872.

Messrs. JOHNSTON BROS.

Since last September, I have performed a great many operations on patients under its (Liquid Nitrous Oxide) influence. Many of these took the gas for 20, 25, 30 and 35 minutes. One took it for (50) fifty minutes, and I saw no reason why she could not have safely taken it for twice that length of time. Dr. Goodwillie has given the gas to two ovariotomy cases for me, one for 27 minutes, the other for 31 minutes. In these it was all that I could wish.

Truly Yours, J. MARION SIMS.

Hopkinton, N. Y., March 18, 1872.

Messrs. JOHNSTON BROS.

I have again exhausted my cylinder, which I received January 10, and I have drawn out 28 doses. I have heard the complaints of cylinders not holding out, but I think they do not shut them tight. I have now had three cylinders, first one had 25 doses; second, 24, and not all out; third, 28 doses. Enclosed please find cylinder to re-fill, and $6.

Yours truly, J. A SHELDON.

REVISED PRICES.

Complete Apparatus—Surgeon's Case....	**No. 1.**	$40 00
Complete Apparatus—Surgeon's Case, with extra sized Bag and Metallic Inhaler....	**No. 2.**	45 00

Boxing either, $1.00.

Each complete apparatus includes a 100 gallon cylinder, filled with Liquid Nitrous Oxide.

Cylinder with 100 gallons of Gas	16 00
Refilling Cylinder	6 00
Morocco covered case, with ring and thumb screw, velvet lined,	12 00
Polished bl'k walnut " " " " "	13 00

Of these latter we have only a limited number.

Rubber Bag, with covered inhaler tubing, (about 4 gall. capacity)	5 00
Rubber Bag, with covered inhaler tubing, extra size	7 00
Inhaler, with spring valves, trumpet mouth-piece, with Plated connection	8 50
Inhaler, latest style, with two way stop cock, adapted to the use of both dentists and surgeons, with connection	9 50
Key, Nickel Plated	1 50
Wrench, "	50
Union, Nickel Plated, (nut and tube), for connecting cylinder and gas bag	1 50
Covered Inhaler Tubing, per foot	50
Plated Connection to fit old style Inhaler	1 00

REMARKS.

When the side of a bag has been perforated, it cannot be repaired, but should be replaced. Send on the tubing by mail, and the bag will be replaced. Price.............. 3 00

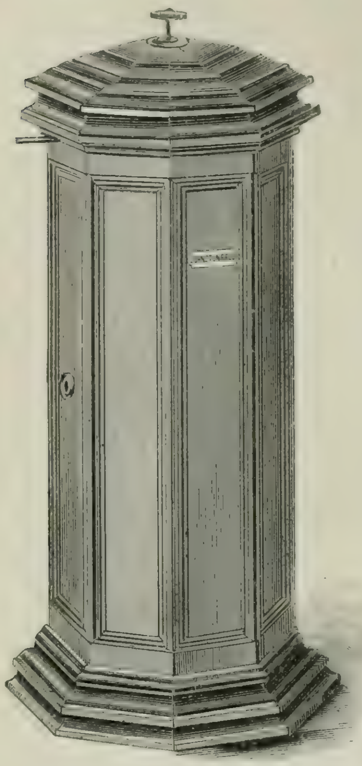
As this cannot be done *properly* except by the use of rubber cement, and by persons experienced in the business, we think it every way advisable that it be entrusted to the rubber workers, and not attempted by the dentist.

JOHNSTON BROS.,

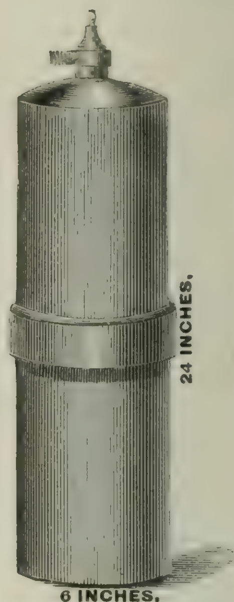
812 BROADWAY, N. Y.

ONE THOUSAND (1000) GALLONS GAS.

LIQUID NITROUS OXIDE.



1000 GALLON CYLINDER CASE.
Price, $30.00. Boxing, $2.00.



1000 GALLON
CYLINDER.
Price, $36.00.
Boxing, $1.50.

Gas in 1000 gallon lots, 4½ cents per gallon.

The above illustrated apparatus is especially desirable where large quantities of nitrous oxide are used, or where it must be sent a great distance. In this form it is best to ship it by *fast freight*—which makes the cost of transportation very light.

THE GAS CAN BE KEPT FOR ANY LENGTH OF TIME,

AND IS

CONSTANTLY ON HAND AND ALWAYS OF THE BEST QUALITY.

PRICE LIST OF A COMPLETE OUTFIT.

1 Black Walnut Paneled Case, octagonal	$30 00
2 1000 gallon Cylinders at $36 00	72 00
2000 gallons of Gas at 4½ cents per gallon, being 25 per cent. less than price in small cylinders	90 00
1 Bag, with covered Inhaler Tubing	5 00
1 Bag, extra size, with covered Inhaler Tubing	7 00
1 Key, Nickel Plated	1 50
1 Wrench, Nickel Plated	50
1 Union, " "	1 50
1 Inhaler—Metallic—with two way stop cock and connection	9 50
	$217 00
Deduct Gas	90 00
Cost of Apparatus	$127 00

By purchasing under this plan a saving of 25 per cent. is effected in the cost of the gas, or on 2,000 gallons of $30.00.

It is right that we should here announce that we have in hand a piece of furniture, which—while it will answer the purpose of the black walnut case illustrated—will also serve as a stand for an ornamental Gasometer.

A cut of it will appear in an early issue of the DENTAL MISCELLANY.

As these large cylinders can easily be sent by fast freight (*the* 100 *gallon size is too small to be so risked*) cost of transportation is reduced to its lowest rate.

JOHNSTON BROTHERS,

812 Broadway, New York.

PORCELAIN TEETH.

Our stock is carefully selected from the factories of the BEST MAKERS, and embraces all of the varieties in use, including Continuous Gum Teeth. We will fill orders on short notice for any manufacture of teeth.

Dentists sending us their orders can rely on receiving prompt attention, and on getting manufacturers' best rates.

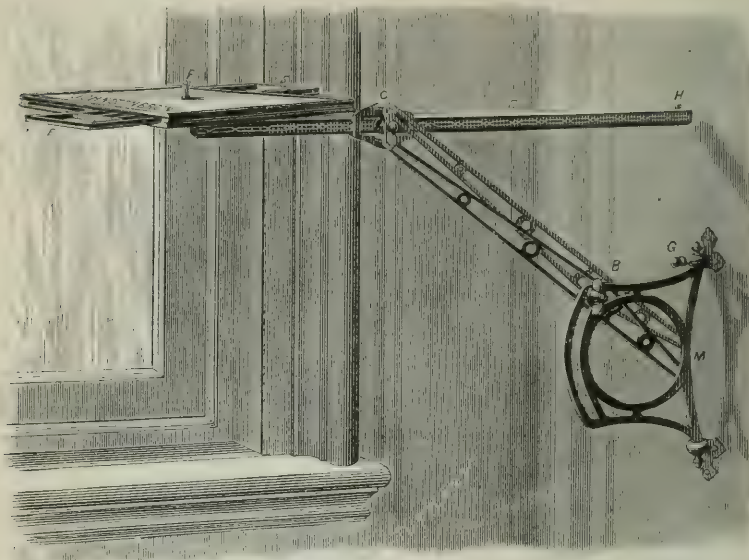
JOHNSTON BROTHERS.

DENTAL GUM—RED.

Johnston Bros.' Nos. 1 and 2, per lb	$2 50
E. Dougherty's Nos. 1 and 2, per lb	2 75
American Hard Rubber Company's, per lb	2 50
Whalebone Rubber, per lb	3 50
Dental Gum—black—per lb	3 00
Gutta Percha, per lb	3 00

JOHNSTON BROTHERS.

MORRISON DENTAL BRACKET.



Price, $25.00. Boxing, $1.00.

The cut represents the table in its highest position, and distant from the wall a little more than half the distance it is capable of taking. By loosening the thumb-screw B, and allowing it to rest in the bottom of the slot, (instead of at the top as represented here,) the table will occupy a position as much below M as it now does above the same point. The extreme range, that is, the distance between the table when at its highest and its lowest position, is 24 inches.

M represents a metal frame which is secured to the wall or other support by screws. It swings from side to side as a gate on its hinges. C. M. represent light but strong metallic arms, hinged at M as a centre and moving up or down. At B is a thumb-screw passing through a slot in the frame M. By it the arms can be firmly clamped at any desired height.

At C is a slide-rest through which the hollow rod D passes freely, and may be clamped at any distance from its ends. At one end of this bar a square table is supported, having in it foil and instrument drawers. This table is capable of rotation round F, which is the burner of an alcohol lamp, the alcohol being contained in D and introduced at its further extremity H. Among the advantages of this bracket are these:

1st. It combines a greater variety of range and movement than any other.
2d. It is rigid in whatever position it is clamped, and will hold 15 lbs. with steadiness.
3d. It provides a clean receptacle for foil and instruments.
4th. It is obvious that a square table is very much more convenient as an instrument stand than a round one.
5th. Its drawers extend through the table and can be opened from either side.
6th. To those having a Morrison Chair it is almost indispensable, as it will follow the chair to either its lowest or its highest position.

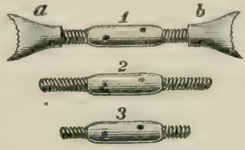
It is handsomely ornamented and nickel-plated throughout, so that it is a very beautiful addition to the furniture of the operating room.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

JACK SCREWS.

Devised by Dr. C. S. LONGSTREET, with Dr. A. MCCOLLOM'S Improved Head.



This device is greatly prized by those who have used it.

PRICES.

Full Set, as above, Nickel Plated, screw and two extra bars ..	$2 50
Jack Screw, Nickel Plated..................................	1 50
Bars, " " each...........................	50

JOHNSTON BROTHERS.

FLOSS SILK.

That recently made for us is unsurpassed in purity, in fineness of fiber and in uniformity. Each spool contains twelve yards.

Price per spool..	$ .15
Price per dozen..	1 50

A liberal discount to Dental Depots and Druggists.

JOHNSTON BROTHERS.

TOOTH POWDER.

A good saponaceous article.

Price in bulk, per pound..................................	$1 00
Five pound lots	4 00

JOHNSTON BROTHERS.

ROYCE TOOTH POWDER. (Excellent.)

Per pound..	$ .75
Five pound lots...	2 50

JOHNSTON BROTHERS.

STYPTIC COTTON.

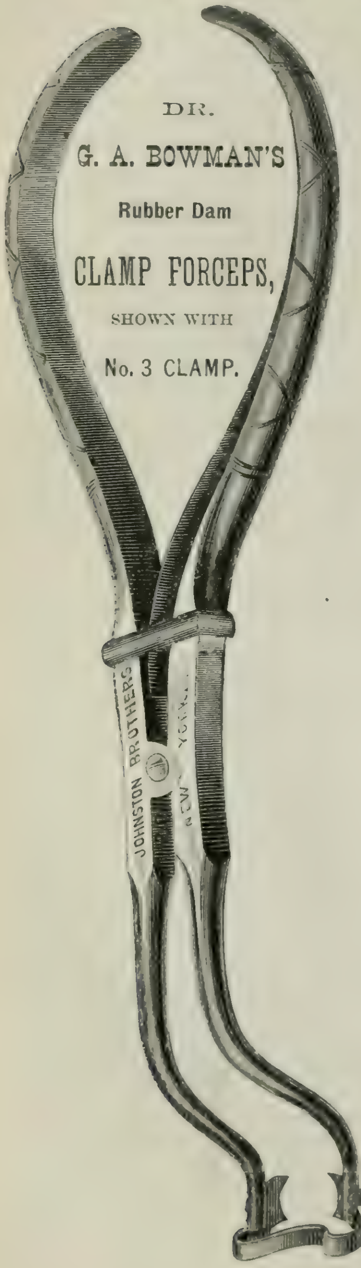
A most excellent article to staunch the flow of blood.

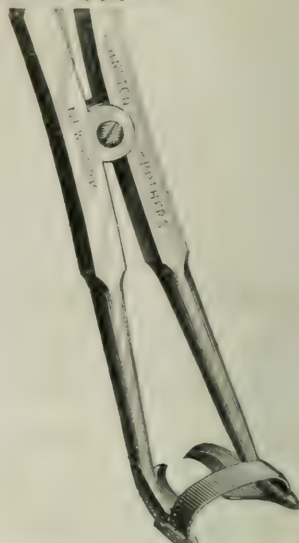
Per box..	$ .30

JOHNSTON BROTHERS.

RUBBER DAM CLAMP FORCEPS.

Of these we offer two styles, both deservedly popular.





POINTS OF DR. T. C. ROYCE'S

Rubber Dam Clamp Forceps,

Shown with Clamp. Handles are exactly like the other style, (Bowman's.)

Both styles of these Forceps have points accurately adapted to the shape of the clamp at the neck, and hence will be found much more convenient than those hitherto offered the profession in this point of adaptation. (See also advertisement of Clamps.)

If so ordered we can supply either style of Forcep with a band, which will keep the Forcep and Clamp extended and ready for use when the hand of the operator is removed, as shown on the Bowman Forcep.

PRICES.

Forcep, either style	$3.00
" " " Nickel Plated	3.50
Complete set of Clamps, embracing eight forms	4.00
Complete set of Clamps, embracing eight forms, plated	4.80
Clamps, each	50
" " plated	60

JOHNSTON BROS.

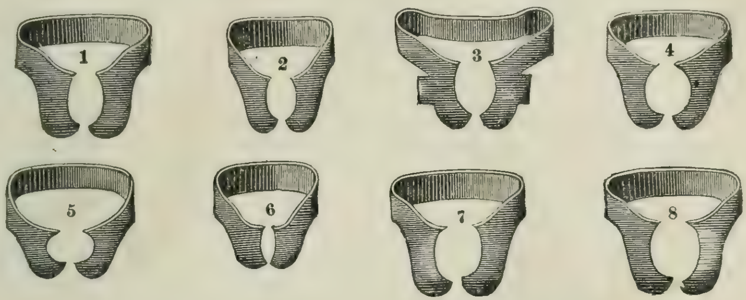
We were never more sure of doing signal service to the Dental Profession than now in offering the

IMPROVED

Rubber Dam Clamps,

INVENTION OF

DR. DELOS PALMER, OF NEW YORK.



Price, set of Eight,	Oil finish,	$4.00.	Each plain,	50 Cents.
	Nickel plated,	4.80.	" Nickeled,	60

For use with Rubber Dam Clamp Forceps.

These Clamps are designed to be placed on the tooth at the commencement of the operation. Afterwards apply the Rubber Dam by passing it over both tooth and clamp.

DESCRIPTION.

Nos. 1 and 2.—Universal Clamp for Molars.

No. 3.—For posterior cavities in molars standing alone.

No. 4.—For third molars, or any molar of a cone shape. This Clamp can oftentimes be turned around while on the tooth, so as to place the bow of the Clamp out of the way of the operator.

No. 5.—For biscuspeds.

No. 6.—For lateral and central incisors.

Nos. 7 and 8.—Rights and Lefts.—For cavities under the gum, on the buccal or lingual surface of molars.

Cuts of two favorite styles of Rubber Dam Clamp Forceps will be found on another page.

These Clamps have prominent points of marked superiority over those of other manufacturers.

First. Each has been carefully adapted to the shape of the tooth for which it is designed, *under the personal supervision of Dr. Delos Palmer*, the inventor.

Second. A groove is made by us in the clamp, into which the forcep nicely fits, so that the clamps firmly hold their position on the forceps, when once adjusted, instead of tilting from one position to another—as is the case when no groove is provided.

JOHNSTON BROS.

NEW YORK COLLEGE OF DENTISTRY,

EIGHTH ANNUAL SESSION,

1873–74.

FACULTY.

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FANEUIL D. WEISSE, M.D., Professor of Regional Anatomy and General Pathology.

FRANK ABBOTT, M.D., Professor of Operative Dentistry and Oral Surgery.

ALEX. W. STEIN, M.D., Professor of Histology, Visceral Anatomy, and Physiology.

F. LE-ROY SATTERLEE, M.D., Professor of Chemistry, Materia Medica, and Therapeutics.

C. A. MARVIN, D.D.S., Professor of Mechanical Dentistry.

J. BOND LITTIG, D.D.S., Adjunct Professor of Mechanical Dentistry.

D. W. WILLIAMSON, D.D.S., Demonstrator of Operative Dentistry.

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C. F. W. BODECKER, D.D.S., Assistant to the Professor of Chemistry, etc.

Students may matriculate at any time, as the Infirmary is open, for regular students of the College to practice in, the entire year.

The regular course of Lectures will commence middle of October, 1874, and continue until the 1st of March. Three hours of each day of the week (except Saturday) will be devoted to lectures, and four hours to *Clinics*, and practice at the Chair, and in the Laboratory, under the direction of the Demonstrators.

The Infirmary consists of two large rooms, each seventy-five feet in length, with an excellent light to operate by, furnished with operating chairs and tables, all arranged to the best advantage for the more perfect instruction of students. Patients are usually in attendance in great numbers.

Tickets for one year's Instruction, including Course of Lectures, Matriculation, Demonstrators', Diploma Fees, and Practice in the Infirmary the seven and one-half months between the sessions....	**$150.00**
For the Course of Lectures only.........	**100.00**
Matriculation (paid but once)	**5.00**
Diploma Fees..........	**30.00**

Board may be obtained for from $4 to $8 per week.

For further information, address

FRANK ABBOTT, M.D., Dean,
78 West Twelfth Street, New York.

HARVARD UNIVERSITY.

Dental Department.

BOSTON, MASS.

1873-74.

FACULTY.

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HENRY J. BIGELOW, M.D., Professor of Surgery and Clinical Surgery.
THOMAS H. CHANDLER, D.M.D., Professor of Mechanical Dentistry.
THOMAS B. HITCHCOCK, M.D., D.M.D., Professor of Dental Pathology and Therapeutics.
GEORGE T. MOFFATT, M.D., D.M.D., Professor of Operative Dentistry.
NATHANIEL W. HAWES, Assistant Professor of Operative Dentistry.
LUTHER D. SHEPARD, D.D.S., Adjunct Professor of Operative Dentistry.
EDWARD S. WOOD, M.D., Assistant Professor of Chemistry.
HENRY P. BOWDITCH, M.D., Assistant Professor of Physiology.
EDWARD A. BOGUE, M.D., University Lecturer on Dental Pathology and Therapeutics.
IRA A. SALMON, D.D.S., University Lecturer on Operative Dentistry.
CHARLES B. PORTER, M.D., Demonstrator of Practical Anatomy.
CHARLES WILSON, D.M.D., Demonstrator in Charge.

Instruction is given during the Academic year, commencing on the 25th of September and continuing till the 24th of June, but is divided into two terms, attendance upon one of which is required for graduation, the other not. The first, or required term, begins September 25th and continues nineteen weeks. The second, or Spring term, which begins February 17th and ends June 24th, is designed to take the place of pupilage with private instructors, and affords better and more varied instruction than can possibly be obtained in any office.

The mode of instruction in the various departments is as follows, viz.:

ANATOMY.—Lectures, recitations and dissections under the direction of the Demonstrator of Anatomy.

PHYSIOLOGY.—Lectures, recitations and practical demonstrations in the Physiological Laboratory.

CHEMISTRY.—Lectures, recitations and practical work in the Chemical Laboratory, each student having his own desk and apparatus.

SURGERY.—Lectures, recitations, operations upon the cadaver, and clinical and operative surgery at the Massachusetts General and City Hospitals each week.

OPERATIVE DENTISTRY.—Lectures, operations at the Dental Infirmary of the Massachusetts General Hospital. There were upwards of five thousand operations performed during the last year.

MECHANICAL DENTISTRY.—Lectures and practical work in the Laboratory. The Infirmary provides an abundant supply of patients.

DENTAL PATHOLOGY AND THERAPEUTICS.—Lectures and recitations aided by specimens, models, diagrams and the microscope.

☞ The University Degree, D.M.D. (*Dentariæ Medicinæ Doctor*), is conferred upon those who fulfill the requirements.

FEES.

Matriculation, $5.00. Spring Session, $50.00. Winter Session, $110.00. For the Year, $150.00. Graduation, $30.00.

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T. B. HITCHCOCK, M.D., D.M.D., Dean,
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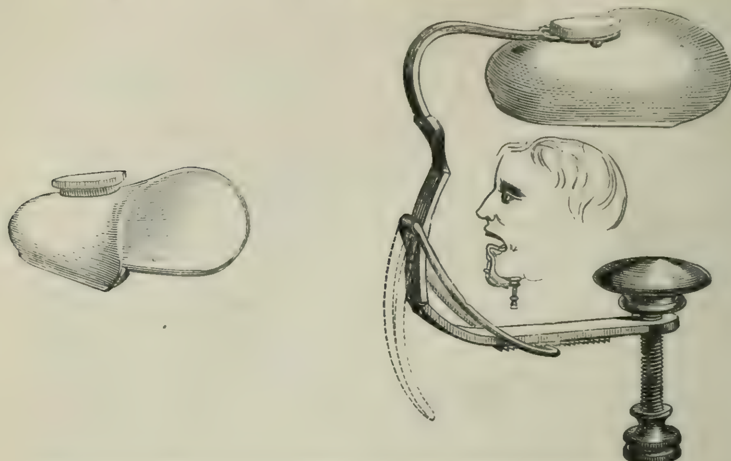
OSBORN'S TONGUE HOLDER.



Osborn's Tongue Holder and Duct Compressor. Is Cleanly, and Reflects Light in the Mouth.

This is by far the best Tongue Holder and Duct Compressor ever offered to the profession. The cut exhibits one adjusted as when in the mouth, also a view of one in use.

It possesses the following advantages, in addition to those of other apparatus designed for the same purpose.

1st. It covers the tongue, and so completely protects it from accident, while at the same time permitting to the patient some chance for changing its position *inside of the cup.*

2d. The cup which covers the tongue being of the finest white porcelain, *reflects light in the mouth*, and so *greatly* aids the operator.

3d. The cups can be readily and perfectly washed, and the use of the apparatus is therefore far less objectionable to the patient than is that of the ordinary metallic tongue holder.

4th. This apparatus is so readily applied that it is often used when the application of rubber dam would be difficult, or require considerable time. The cup pressing upon a pledget of spunk or bibulous paper nicely placed upon the ducts effectually prevents the flow of saliva.

It is recommended by Drs. William H. Allen, W. C., Bennett, and Frank Abbott, of New York city, and C. Fones, of Bridgeport, Conn.

PRICES.

Complete, with three porcelain cups	$10 00
Sets of three cups	4 00
Single cups	1 50

JOHNSTON BROTHERS.

JOHNSTONS'

Dental Miscellany.

VOL. I.——*JUNE, 1874.*——NO. *6.*

IRREGULARITIES.

Continued.

By NORMAN W. KINGSLEY, M.D.S., D.D.S.

The following case is introduced in connection with the one described in the last number of this Journal, because it involves points of unusual interest; including the origin of the deformity, difference in the aspect and difference in the method of correction.

The patient was an elder sister of the one referred to. The points of similarity in the two cases were that the incisor teeth projected, and the palatine arch was narrow; but the shape of the dental or alveolar arch was entirely different.

Fig. 1.

Fig. 1 shows the profile view. The incisors tipped up and projecting, one central lapping over the other, and all the teeth back of the canines articulating inside the corresponding lower ones. Fig. 2, when compared with Fig. 2, page 172, shows how the arch differed in form from that of the younger sister. The effect upon the facial expression was as unlike as was the form of the jaws.

In the younger sister the upper lip was pinched, and pushed forward in the centre ; in the present case of the elder, the whole breadth of the upper lip was advanced and most markedly curled up, the teeth being nearly always exposed.

Evidently the first esthetic consideration was the reduction of this prominent dental arch, and as the teeth were all in close contact, this could only be done by the removal of some of the teeth, or by expanding the palatine arch.

Practically, then, the widening at the sides became the first step in the process of correction.

A vulcanite plate and a jack-screw, such as described on page 173, and here shown in Fig. 2, was introduced. It differed from the aforementioned one in some respects, as follows.

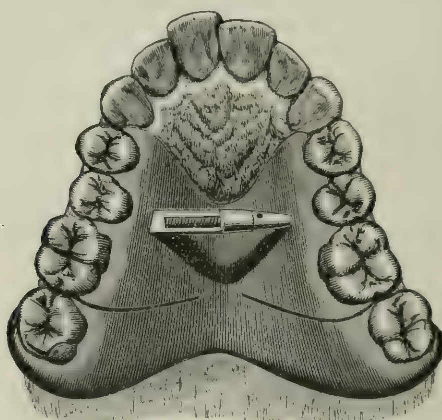


Fig. 2

The second molars were so wide apart already that it was desirable to avoid spreading them. The vulcanite plate therefore clasped and embraced them. The pressure of the jack-screw was desired equally against the two bicuspids and the first molar on each side ; it was therefore placed midway ; *i.e.*, above and against the second bicuspid, and to avoid the second molar being influenced by it the plate was sawn down with a watch-spring saw nearly to the middle just behind the first molar, as seen in the engraving. This fixture was adjusted on the 26th of February and worn for thirty days, the screw being tightened from day to day by the patient, but she presented herself to the office frequently for inspection.

During this process it became evident that the continuance of this expansion would create a deformity of more importance than the first one.

The movement of the side teeth developed the fact unquestionably that the apices of their roots were based upon a maxilla so narrow that the further widening of the arch would have presented the palatine surface of the upper teeth to the grinding surface of the lower ones.

The divergence of the crowns was such, that had the expansion been continued until the prominence in front could have been reduced, it would have broken up the articulation of the teeth, thrown the jaws wider apart, and increased the gap between the upper and lower incisors. The width already gained was equal to more than half the diameter of the teeth operated upon, but as it was far from sufficient to allow the front teeth to come back, there was but one alternative ; namely : the extraction of a tooth on each side.

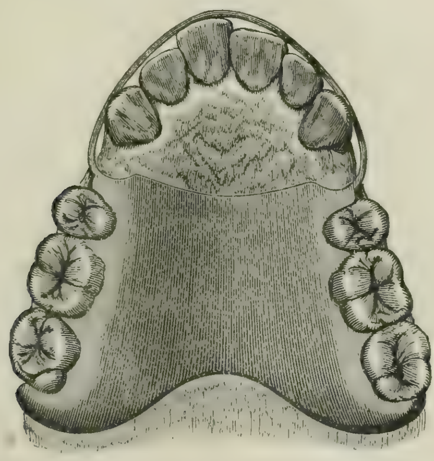


Fig. 3.

As the patient had reached maturity, and the teeth were all equally sound, the removal of the first bicuspid was decided upon as simplifying materially the subsequent steps. If the patient had been at this time only thirteen years of age instead of eighteen, I would have extracted the first permanent molars instead of the bicuspids.

On the third of April these teeth were extracted and a new regulating plate adjusted, which is shown in Fig. 3. This appliance is not unlike the retaining plate made for the sister, and described on page 177. Its

object being the reduction of the six front teeth, it effected that result as follows :

The plate was accurately adjusted to fit and catch between the bicuspids and molars. The gold wire in front was elastic and springy. It was bent so as to impinge upon the incisors ; then caught in front of them ; pulled back and sprung into its place.

As fast as the reduction was accomplished, the wire was bent at the sides where the teeth had been extracted and also contracted.

So far as any variety of fixture was concerned, this, in fact, completed the treatment. This same appliance, or one like it to all intents and purposes, became the retaining plate, which was worn a number of months, and even now, nearly a year, has not been entirely discarded.

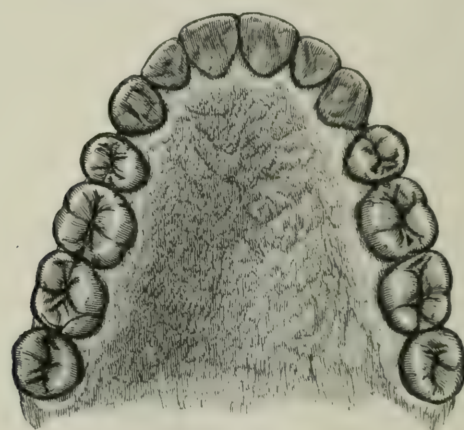


Fig. 4.

Fig. 4 shows the form of the arch at the present writing. It has rounded very symmetrically, and the space formerly occupied by the first bicuspids has nearly closed up. The third molars have made their appearance, the articulation with the lower teeth is good, and not likely to break up the present arrangement. While it was, without doubt, quite possible to have so enlarged the arch as to admit the full number of teeth into a symmetrical line, I am fully satisfied that it would have created a deformity equal to the one I was reducing.

One point in this case of considerable importance, was the apparent want of correspondence in the size of the superior and inferior maxillæ. It will be borne in mind that any attempt to widen the palatine arch,

sufficient for the cusps of the upper teeth to articulate naturally outside the cusps of the lower ones, would have ended in failure. From this it may be inferred that the superior maxilla was too narrow, and the inferior too wide for such a correspondence ; but a careful observation of the external features did not disclose any discrepancy. Had it been in reality a deformity of the jaw-bones, there would have been a want of symmetry in the face ; but the face was regular in its outline, with no evidence of pinching across the middle, nor of undue width at its base.

The want of correspondence was therefore due entirely to the dental development. The dental arch of the lower jaw was of unusual width, and this was owing, in all probability, partly to the malocclusion of the upper teeth, and partly to causes to be mentioned hereafter. The false articulation in this case operated not only on the upper ones, so as to narrow the arch, but also in a reverse direction on the lower arch, to widen it. There is no doubt but that a true articulation of both jaws could have been attained by narrowing the lower dental arch, but this was not altogether feasible, nor did the surrounding circumstances justify an attempt.

An inquiry into the etiology of the irregular dental development of these sisters convinces me that the primary disposition, so far as they were concerned, was hereditary. I saw no evidence of this, however, in either of the parents, whose teeth were well developed and regular, and had no suspicion of the inherited character until after the regulation was accomplished, when I met a sister of the mother, and was impressed not only with a strong general likeness to her nieces, but with a dental irregularity of the same general character viz., narrow upper jaw and protruding incisors ; in fact, the expression of the mouth was identical with that of one of the young ladies before treatment. But this discovery did not account for the marked differences in the dental arrangement of the young ladies.

A further inquiry revealed the fact that the elder sister (Figs. 1, 2, 3, present article), was an immoderate thumb-sucker during all the earlier years of her life ; in fact, according to her own statement, continuing the practice until after she was ten years of age ; while the younger one had never contracted such a habit. With this knowledge the solution of the problem was not difficult.

A tendency to a contraction across the palatine arch was hereditary ; the protrusion of the incisors was the result of that contraction, and also hereditary.

The younger sister had preserved that inherited character, modified

only by accidental circumstances, during the eruption and growth of the teeth. But the thumb-sucking habit of the elder sister had changed entirely the inherited form. The constant presence of the thumb had retained the advanced position of the centrals, and had also brought forward and rounded out all the six front teeth, while at the same time this influence upon the lower jaw would have been likely to force back the front teeth and expand the sides. It was thus, in all probability, both the mal-occlusion and the thumb-sucking which produced the unusual width of the inferior dental arch.

It has been asserted by some observers that these narrow dental arches are the result of enlarged tonsils, compelling a constantly opened mouth for respiration, but in neither of these cases was there any enlargement of the tonsils, nor any unusual tendency to keeping the mouth open.

It has also been maintained that these same V-shaped or pinched arches were associated with abnormally high palatine vaults ; and that the same characteristics were peculiar to congenital idiots ; but there is not the least evidence of a mental development below the average in either of the cases under consideration, but rather the contrary ; an intelligence and refinement belonging only to the higher classes of society.

A CASE IN PRACTICE.

By A. H. Best, M.D., Dentist, Savannah, Ga.

A few weeks ago, a boy aged twelve called to have a left superior central incisor extracted, as it was then causing considerable trouble, and had been for some time. The external appearance of the offending member was good, save a little discoloration and a slight fracture at the cutting edge. The tooth showed no signs of caries on any of the surfaces, and I was (on account of the very small portion removed from its cutting edge, which I hardly thought sufficient to expose a nerve), led to make farther inquiry regarding the case.

The patient was of a sanguine bilious temperament, and an exceedingly healthy looking individual, while all the teeth but the one mentioned, as well as their surrounding parts, presented a healthy appearance. In answer to my question regarding the fracture of the tooth, I was informed that it was the result of a fall when he was between the ages of seven and eight years, but that the tooth had caused no trouble for nearly three years after the accident. Examining the fracture, I found a cavity which proved to be continuous with the pulp canal. After

probing, I diagnosed the case an alveolar abscess and the tooth not beyond being saved.

I advised treatment, with hopes of allaying the inflammation of which the present troubles were a consequence, thinking that if relief could be given there would be some probability of saving the tooth, but in this particular my suggestions did not meet the approbation of either he or his father, both being determined to have it extracted. I finally extracted the tooth. It was about two-thirds its natural length, being deficient in a portion of its root, to which was, however, added a dark substance, resembling in shape the deficient portion of the fang. It was hard, and was easily removed from its place of lodgment. Upon the impulse of the moment I thought it might possibly be a coagulated pulp, a result of the fall, and I may also mention that others who examined it were of the same opinion ; but a few days ago I removed this substance from the tooth and thoroughly washed it, after which I found that it was not a devitalized pulp, but a solid piece of wood. I then passed a probe through the canal, and removed several other chips, also loose and very much charred. The little patient denied any knowledge of this substance whatever, though from what motive I am totally unable to say—probably from fear of his father. I do not believe this wood to have been driven in the pulp canal at the time of the fall, but rather that the injuries received at the time of the fall produced the death of the nerve previous to the complete formation of the tooth, from which cause we have an enlarged pulp canal, and an incomplete fang, as a result. I think these chips, or pieces of wood, were probably placed there during his efforts to remove particles of food from the cavity. I do not think their presence could be possibly accounted for in any other way. And I am satisfied that no course of treatment would have done the good hoped for, and am further convinced that no case, however simple, can be prognosed upon the simple information given by the patient, and that unless our doings are fully warranted by a correct knowledge of dental surgery, and a full determination to do our duty, we will often find that, though our paths seem at first to be strewn with flowers, our efforts will not be crowned with success.

An English exchange says that carbolic acid is a deadly poison to snakes, and experiments have proved that a few drops are sufficient to cause almost instant death to the dreaded cobra, and suggests that it might be invaluable in India and other tropical countries.

NEW YORK ODONTOLOGICAL SOCIETY.

Regular monthly meeting of the Society was held at the residence of Dr. B. Lord, on Tuesday evening, April 21st. President A. L. Northrop in the chair.

Dr. Clowes related a case in which the excessive eating of grapes had caused severe pain in the teeth of the upper jaw. Abstinence from the cause, and the use of lime water, effected a cure.

Dr. Perry exhibited one of Fisk's aliva ejectors—an apparatus designed to carry the saliva from the mouth by means of suction obtained by a stream of water passing through a portion of the tube.

Dr. Kingsley : I want to tell you how I plastered a room to-day. A patient presented herself to me, and upon examination I found the roof of the mouth in front of the soft palate entirely gone. There was one molar tooth on each side of the jaw ; but no bone at all to support the lower end of the nose ; and simply a contracted cartilaginous ring, occupying the place of the alveolar process. Contracted, I say, because it had drawn the lip half an inch within its original position, and drawn the nose down the same way. I wanted to get a model of those parts, as I proposed to lift up that nose, and carry out that lip. But the parts being very irregular in form above, and the cavity being much larger than the passage to it, and, moreover, the cartilaginous ring being so much contracted, it was a difficult thing to take an impression of it in plaster, and get the cast out ; being very much like taking an impression of a balloon by going through its neck. I took some thick plaster, but mixed so as to harden slowly, and plastered that room all round. The plaster having set, with an instrument I nicked the plastering in front ; it cracked into several pieces and came out, when I reunited them, and have a perfect impression of that room.

Dr. Corydon Palmer explained and illustrated the arrangement of the human teeth, and the principles that should be observed in making artificial teeth, as follows. (See "Notes," page 239.)

Gentlemen of the Society : I don't know when I have responded to a call, feeling so much embarrassment as I do to-night. I have sometimes been before our national meeting, and I must say that I feel a greater degree of embarrassment here, than I ever have in that place.

I have selected from quite a number of drawings, some which pertain to artistic restoration, as that part of our science has been much neglected. The disposition has been to pass over operations of that

kind lightly, get something into the mouth that would answer the purpose, and procure the fee for it, without much care towards reproducing the natural expression lost by the sinking of the muscles.

I shall endeavor to bring before you, in the first place, the most common mode of modeling or forming the teeth and plates which are inserted in the mouth, and afterwards that which I consider to be the more perfect adaptation ; that which will tend to give restoration in all the parts, and bring back that which has been lost by disease, or by too rudely wrenching away the processes, which is a very common practice in extracting teeth. The practice of taking away the outer plate of the alveoli, after extracting teeth, has been advocated by some. It is a practice that can scarcely be too much deprecated. We ought to be careful in the removal of the teeth, to save as much as possible the natural fullness of the mouth, in order to preserve the natural expression. When it is taken away, the muscles of the face contract, and no artificial substitute can restore fully the natural expression of the person.

There are some marked features about the arrangement of the natural teeth, which deserve our attention.

The first perhaps great feature which marks the arrangement or articulation of the teeth, is the cusps. The inner row of the inferior arch is shaded out upon the posterior part of the anterior teeth, into light, mere shades of cusps. It is more marked in the superior arch ; so much so that there will be a depression upon the tooth. The cusps of the superior teeth form one continuous ridge, overlapping the entire inferior arrangement of the teeth. The strong, heavy inner cusps of the superior molars, when the teeth are brought together, fall into a sort of trough or groove, which is distinctly marked in the inferior teeth, while the outer cusps are allowed to overlap or shut over. There is a wise provision in this. The outer row of cusps serve to hold out the cheek, while the inner cusps of the inferior teeth form a ledge for the tongue to raise the food upon, and thus the work of mastication is more conveniently and perfectly performed. Now, I regard this as a very important feature in the teeth, and one to be observed in the making of artificial sets. A great fault in artificial teeth which we are obliged to use, is that they have no size. It is an imposition upon our patients to put teeth into their mouths that have so little grinding surface.

The next marked feature in the formation of the teeth, is the grand curve the cutting surfaces describe ; and in any arrangement of artificial teeth for a full set, it is important to observe this feature. I believe it is sometimes a fault of dentists that there is a want of adaptation in the

opposite grinding surfaces of their teeth, so that they do not come together always at the same line or points of contact. The cusps are so taken off that they come together here and there, and that, too, on a straight line, not observing even the natural curve. When this principle of conformity is carried out, and every tooth comes to a certain place, then the curve being kept, and the teeth antagonising in that way, every time the mouth comes together it tends to put the teeth in place. It is a marked feature in every mouth.

Examine skulls, and the arrangement of the natural teeth, and you will find it so; and it is a wise and beautiful arrangement. It gives the advantage of concentration of the food, and of strength, and it harmonizes with the play of the mouth in the articulation of sound.

Now I wish to insist upon the principle that that curve should be observed in the arrangement of artificial teeth, and that the outer cusps of the superior teeth should shut over the lower ones.

It is a common practice to arrange the teeth so that when they come together, the anterior teeth of the superior set will strike almost square upon the inferior ones.

One reason is, the teeth are made too small, and if it is in rubber work, it is impossible to find sections which will grind up and give the proper distance. They will fall short almost invariably, about half the size of a tooth in the space of the six anterior teeth. This contracts the size of the arch, and causes the superior incisors to strike nearly on top of the inferior ones. If you take a cast of an inferior set of natural teeth, and make a superior piece to it, you will find great difficulty, and there is no such thing as a correct articulation unless continuous gum work is used; and I consider that really the finest style of work there is.

Dr. Palmer here exhibited a number of drawings. No. 1, representing a side view of an ordinary set of artificial teeth, the cutting edges arranged upon a straight line. No. 2, a lingual view of the ordinary arrangement of artificial teeth, where the teeth are arranged in a circular form with the bicuspids very prominent. No. 3, intended to represent the more proper arrangement of the teeth, showing the bicuspids depressed, and making the cuspids to give the natural expression to the mouth, and also showing the extensions upon the sides for restoration. No. 4, representing a side view of the superior and inferior arch, showing the manner in which the teeth come together, the curves before mentioned, and also showing the form of the extensions brought in to give restoration.

Dr. Palmer proceeded to describe the above as follows: The first il-

lustration that I show you is designed to represent a side view of an ordinary set of teeth as arranged for the mouth. The teeth are arranged on a straight line, no provision being made for the attachment on each side, no attempt being made to carry out the natural curves, doing nothing towards restoration, it is not retained in the mouth as well as it should be, and sometimes cuts in badly. Here (No. 2) I have a representation of the palatine, or rather lingual aspect of an ordinary piece, the bicuspids being made to show more prominently than the cuspids. Now I wish to call your attention to another marked feature in the bicuspid teeth that are produced for our use, and try once more to demonstrate to the minds of my brother dentists the fault of those teeth, as they are given to us by the men who make them, and who will carry out this faulty formation.

In nature the front part or slope of the bicuspid teeth of the superior arch is the least prominent part of the teeth, but in all the teeth we have to use, it is just the reverse. They have got it into their heads that the eye-tooth points forward ; that the ridge of the tooth is forward of the centre, and so it is ; but they cannot see that as soon as they leave that there is a change, but the change is right there. The longest slope on the cuspids is from a point forward of the centre, back, and the longest on the bicuspid is from a point back of the centre, forward. The ridge of the tooth is a little past the centre, making the back presentation of the tooth the most prominent. Now when you come there it changes again. The superior first molar is the most prominent tooth on the side of the face. There, there is a change ; the anterior buccal cusp is prominent. The anterior cusp and ridge is the most prominent in all three of the superior molars. Now if you examine the cutting edges of those bicuspids, you will find the slope the same. The anterior buccal corner of the first bicuspid is where that curve ends on the side of the mouth. The case is different in the inferior bicuspids. There they do point forwards. Their ridge is forward of the centre, and the longest slope is back of the ridge on the buccal surface, and on the cutting edges of the tooth, its shortest slope is from the anterior buccal corner towards the point of the cusp. It is exactly the reverse of the upper, and it is the only place where this feature varies from the general rule. This being the form of the teeth, when they are brought together one is not shocked by seeing bicuspid teeth protruding every time the person speaks. While they must be there to perform their functions, nature makes an effort to conceal them in ordinary conversation. The most perfect development of the human countenance

tends to depress them. Taking the lower and uncultivated types of humanity, you find in them a large development of that circular form; but rising in the scale of intelligence and civilization, in the cultivation of sound and gestures, there is a tendency to depression upon the sides. That (No. 2) represents a bad arrangement; one where the bicuspids are too prominent; and the incisors and cuspids made too small and contracted. This (No. 3) represents the more proper arrangement, showing upon the sides the extensions required in almost every case. According to my experience there are no cases but that need more or less of that extension upon the sides, and also above the cuspids, to give expression and to help retain the piece in the mouth.

That drawing (No. 4) is designed to represent the principle fully carried out in restoration. You may go upon that plan more or less, as the case may require. There all the curves are represented that will be met with as a type. It is a very great help in adapting pieces to the mouth, to carry up the plate as high as possible, and then turned over very smoothly, so as to present a nice edge. Thus adapted, the plate will be worn with much greater ease than if cut short and not turned over. This principle should be applied to the inferior as well as the superior arch, or else there will be no good effect. The light shades here (No. 4) represent the prominent portions. Those parts above the cnspids should be rounded out prominently, and this ridge carried up so as to model up and reproduce as near as can be, the expression of the part lost. You can carry the work much further in these extensions than one would at first suppose. After forming the plate it should be bent off a little from the true fit, so that it will not press too hard. It is my practice to model those edges most carefully to the mouth after the plates are formed. I do not depend upon striking them on a die, because there is no one can take the model of a plaster cast, or trim the model or impression by guess, so as to get those curves exactly right.

There is more in this than the mere usefulness of the work. We want to make restoration for the articulation of sound, for beauty of expression, studying to give as near as possible that which nature had produced.

In this connection I would not fail to do Dr. John Allen the justice to state that he is the author of this feature of extension—that I only claim to have made it a study, and endeavored to perfect it.

The speaker exhibited a tooth, representing the feature which had been described, tending to prove that the statement was correct in reference to the form of the superior bicuspids.

Dr Kingsley : I cannot fully endorse Dr. Palmer's statements. I do not say that Dr. Palmer did not see exactly what he says there. But lately I have been doing something in the way of regulating teeth, and my study of nature would lead me to go to work and regulate those drawings which he offers as types. Some points to which he has called our attention are points I have seen, but I have studied a good many skulls, ancient and modern, having a good development of teeth, and I have seen nothing in well-developed skulls that looks to me as that looks to me, either in the line of the grinding surface, or the pitch of the front teeth. Who establishes the type to be followed? It can only come from the examination of a large number of cases. If you vary from that, and allow your own judgment to dictate the matter, it is simply a question of individual taste.

More than twenty years ago, a man who is the highest authority in that particular part of dentistry of any in our city, remarked, "I do not believe in cog-wheeling them together." Now, young teeth are cog-wheeled together. The inference from Dr. Palmer's remarks is, that it is necessary that artificial teeth should be cog-wheeled together for masticating purposes. Look at the Aborigines all over the world, or those that you pick up here in New York city, with great, big, strong teeth, cog-wheeled together I will admit when they were young, but before they got to be twenty-five years of age those cusps were worn off, and, by the time they attained full manhood, worn entirely down, and so the rule in civilized life is that well-developed teeth lose very shortly that cog-wheeled character, and the grinding surfaces do not interlock to any very considerable extent, but are nearly flat. And shall we say that cusps interlocking are essential to mastication? There are two sides to this question, and we get the two sides when we follow nature. We find nature is constantly changing, and we have not yet learned what nature does teach us. I am glad, however, that Dr. Palmer has spoken on the subject, and I must do him the credit to say that I do not believe many of you have given the subject as much thought as he has.

Dr. Palmer : So far as getting a type is concerned, I have made my observations from a very large number of natural teeth, and I have been in the habit of modeling and carving in that way. Having studied the subject a great deal, I have in my mind every point and line in the shape of the teeth, and it is not the exception, but it is the rule, as I have described it, and the exception would be to find it otherwise.

There is one point I had forgotten to mention. It is that, as a type,

the first inferior molar has five cusps, and it does not occur anywhere else in the human mouth. It does not occur in every case, but it is so in the most perfect development of the human teeth.

Dr. John Allen : I must compliment Dr. Palmer upon his painstaking and thoughtful presentation of the subject, and, with Dr. Kingsley, I am glad he has laid the subject before us. It causes us to reflect, and then to square the principles laid down by him with our own experience.

I have found that nature works with the human organs a great deal as she does with many other things. She does not go by mechanical rule, as some of our mechanical dentists do. When nature makes a tree it is not by any regulation pattern. You do not find the limbs placed upon each tree exactly alike. Each tree has its individuality of shape and outline. She does not work by specific rules. So in our art, we do not have any two cases alike. I will make one exception to this in my own practice. A case where I made a set of teeth for a lady, and in a year or two she came back and wanted another set made, inasmuch as she had given her own to her mother. She said they fitted her mother's mouth just as well as they did hers. That is the only case I ever heard of. As a general rule I have the line from the cuspids back, almost straight.

There is another practical point I would refer to. It is that the pressure from the upper and the lower teeth, when they come together, should be upon the inner rather than the outer cusps. By that means, the patient can get a grip that will tell in masticating food, whereas, if the pressure be on the outer cusps it is liable to break the plate, or dislodge it. With respect to this curve on the cutting edges, I will admit that to some extent it is proper, and we find it so in many perfect sets of teeth ; but it is also true that as age comes creeping on they become changed so that that form is lost. Again, there is a difference in different nations. What may be the true type of one nation may not be the true type of another.

In some nations we find them much longer, and differently arranged to a considerable extent, than we have here.

Even here we have a difference. I know of no general rule by which we can be governed. If it were so, artificial dentistry would not be half as hard as it is, for I look upon it as one of the most difficult branches of our profession.

In regard to plumpers, as they are termed, I think they are rarely required. It depends altogether upon the temperament. In the lym-

phatic temperament, the individual may lose all the teeth, and yet there is adipose tissue enough to keep the face in good form without attachments upon the sides at all. But if the person is of a nervous sanguine temperament, the face will fall in, and that individual requires those muscles that are sunken to be raised.

Dr. Bogue : I would like to ask Dr. Kingsley a question before the subject is forgotten. I want to know whether he has noticed, in the course of his observations, that the wearing down of the cusps is indicative of a large amount of vital force and energy, and whether the cusps do not remain in persons of feeble body?

Dr. Kingsley : I don't know whether it is that, or the nature of the food. Yet, coming to our own people, where the character of the food is such that it would not be likely to produce that result, it is very probable that the inference made by Dr. Bogue is correct.

A Member : Will Dr Palmer be kind enough to tell us what he considers the highest type of dental development?

Dr. Palmer : I think I can. The difference is very great. If you would find the most beautifully developed teeth, you should look for them in some of the best developed skulls of women. The English people have very handsome teeth. Some of them are of that type that I consider the most beautiful. The incisors would be on a gentle curve. They would be long rather than wide and short, with the edge not quite so wide as it is a little above. The arch does not form a circle like a horse-shoe, but the bicuspids are dropped in a little, so that the cuspids make the expression, or turn of the mouth. It would not be much marked, because there is no feature much marked in such a mouth. The teeth should be free from those indentations we find in scrofulous patients, the enamel beautifully polished, and the teeth not over-sized.

A Member : It seems to me, then, that nearly all the persons who come to us for artificial teeth, do not possess the highest type. Should we follow out the highest type in replacing their organs?

Dr. Palmer : Not at all. I only claim that the great general principles should be first fixed in the mind, and then deviate to suit individual cases.

Dr. W. H. Dwinelle : It seems to me the whole matter is embraced in a single expression used by artists, "keeping harmony." What would be the highest type in one person would be the lowest in another. The person of dark complexion, short build, bilious temperament, whose tendencies are toward breadth in all directions, would look very inharmonious with a set of long teeth, lightly tinted, and so *vice versa*.

Dr. Lord read an essay advocating the use of soft unannealed foil in almost all cavities to be filled with gold.

Dr. Brockway: I have been much pleased with the paper read by Dr. Lord. I have come to his views upon the matter of soft gold through the usual course of tribulation. I was brought up to use soft foil under the lead of Dr. Wescott before the day of adhesive gold, but gradually abandoned that practice for adhesive gold, supposing, as has been taught for the last ten or fifteen years, that it was a decided improvement and advantage. My experience has not confirmed that view of the case.

As Dr. Lord has stated, there are cases where adhesive gold is useful and cannot be dispensed with; but I take the ground that if adhesive gold had not been introduced, our profession would stand higher as savers of teeth, and the community would be better off to-day.

Dr. Clowes: I used non-adhesive gold some twenty years, and then adhesive gold came to my notice shortly after Dr. Atkinson came to this city. It was a long time before I could persuade myself, as I looked and saw him putting in fillings, that two pieces of gold could be welded. I have now been operating ten or twelve years with it, and the more I use adhesive gold the better I like it. If there is anything perfectly admirable in the material for a plug, it is adhesive gold. There is no occasion for a failure in its use, and if one does occur, it is because you do not take time. You put in the filling in too large pieces at a time.

In regard to the rubber dam—when I hear a man speaking against the rubber dam as being unnecessary, and rather an obstruction than otherwise, all I can say is, he is perverse. I shall never be able to express the relief that was afforded me by that admirable means of keeping cavities dry.

Dr. Dwinelle: One word in regard to the rubber dam. I do not think any encomium can be too great in its praise. By means of it, we are able to perform operations that hitherto were performed under great perplexity. Previous to its use, the moisture would insidiously steal in upon us, but the rubber dam insures us against any possible failure in this respect.

Another word in regard to soft and adhesive foils. If I were going to caulk a ship, I would use flexible oakum rather than steel rope. Possibly we might caulk the ship with steel rope, but it would take a great deal of time and lateral pressure. I think common sense teaches us that a soft, flexible material is the best. Adhesive foil, soft and

pliable, in the hands of a skillful man, will produce excellent results. The welding property of adhesive foil is a great desideratum, but soft foil is a better article for producing absolute stopping than a harsher material.

I will speak of another quality of gold. I believe it was not known until Dr. Watts and myself exemplified the fact, that absolute gold is always adhesive. That it is a peculiar quality of pure gold, and that is one beautiful and peculiar quality that crowns sponge gold. To come to the truth of crystal gold—I go into mourning when I speak with any degree of qualification of it. Crystal gold has been sent upon this market that ought to be a disgrace to anybody. I was the person who introduced it to the profession, and a poor article has continually been pushed upon the market, so that we have no right to judge crystal gold proper, by crystal gold improper. But pure crystal gold is the par excellence material for filling teeth. I have, since 1853, been in the habit of filling teeth with it. The only way that gold can be made absolute, is by the process by which crystal gold is manufactured. I can show you crystal gold fillings of the date of 1853, 1854, and 1856, where entire crowns, built up two-thirds or three-fourths around the articulation of the inferior incisors, the upper teeth impinging upon them constantly, and showing the marks by burnished surfaces where the edges have been used in mastication, standing the test for over twenty years, and I defy any one to show any imperfection in them, and I defy any human being, dentist or otherwise, to show that they are not equal in every respect to any gold filling that was ever made.

But it is the person behind the instrument that performs the superior operation. An unskillful person, with the best material in the world, and the finest instruments, will not accomplish that which a skillful person will accomplish with the most indifferent material and instruments.

Dr. Atkinson: We have all endorsed the idea that our prime ambition is to get at the truth. Allow me to make a few suggestions as to the great difficulty. Before we were aware of it, we were welding gold; but not being aware of it, we were under the impression that it was very important that we have the inner portion of the cavity larger than the external portion. Preparation of the cavity has quite as much to do with making a good filling as anything. Now, all cohesive gold packs directly in front of the pressure, and this is just the excellence of crystal gold; but crystal gold cannot compare with foil in toughness of texture. In hardness it excels. I am on both sides of almost every

question, and I endorse almost everything that has been said, in the sense that it has been said.

The most cohesive gold may be as soft and plastic as anything can be. Give me good results. That is the great object. First prepare the cavity as it ought to be prepared. If you want to pack gold well, pack it dry I grant that you can plug a cavity of regular shape with soft gold of quite a low number. I use No. 30.

Adjourned.

WM. JARVIE, JR., *Recording Secretary.*

TESTIMONIAL TO DR. S. C. BARNUM.

At the last meeting of the American Dental Association at Put-in-bay, the following resolution was offered :

Resolved, That a committee of three be appointed to carry into effect the resolution passed at Nashville, Tenn., namely : "To raise one thousand dollars to present Dr. S. C. Barnum, as a slight appreciation of his invaluable gift to the profession."

This resolution was unanimously adopted, and the following committee appointed by the President : G. W. Keely Ohio ; G. F. S. Wright, South Carolina ; J. N. Crouse, Illinois. (See page 22, last Transactions.)

It is well known that Dr. Barnum generously donated the use of the Rubber Dam to the profession, now so indispensable in the operation of filling teeth ; and it is universally acknowledged to be one of the most important appliances in the hands of the dentist—so much so, that no operator can afford to do without it.

The Committee feel, in presenting this claim, they are but giving all the blessed privilege of contributing to this Testimonial Fund ; and we hope to increase it to ten times the amount contemplated in the resolution. Dr. Barnum has never asked anything of the profession. Had he secured a patent, and charged each dentist a moderate sum for its use, to-day he might have been wealthy.

No dentist who does any considerable amount of operating would do without the Rubber Dam—even if it cost him one hundred dollars per year. Now, let us do our friend justice, by at once giving our mite to this fund, that our conscience may be at rest. As the time is short, (before the Committee are to report at Detroit, Mich., first Tuesday in August), it is important that contributions be sent at once to either of

the committee, with an expression of opinion as to the value of the Rubber Dam, that these letters may be preserved, and presented Dr. Barnum with the funds.

The Committee would also suggest the propriety of calling meetings in all cities, to take action and assist in this good work, and that societies contribute from their funds, which can be sent now, or handed to them at Detroit; the latter would be preferred. But one society has been directly appealed to, and all the funds in the treasury were freely given. The Committee desire that all funds raised be applied directly to the object, and to avoid expense, would respectfully ask the assistance and co-operation of the profession in this good work. All funds sent us should be by draft or post-office money order.

P. S.—When any considerable amount is sent, let it be by draft on New York, payable to the order of S. C. Barnum.

Geo. W. Keely, Oxford, Butler Co., O.
G. F. S. Wright, Pomaria, S. C.
J. N. Crouse, 652 Wabash Avenue, Chicago, Ill.

Oxford, O., April, 1874.

VIVISECTION.

By Michael Foster, MD., F.R.S., Professor of Physiology in the University of Cambridge.

(*Concluded.*)

The second class of experiments carried on without anæsthetics—those entailing a considerable amount of pain—are not only by far the least numerous, *but must of necessity become less and less numerous as physiology advances.* The end which the physiologist has in view is to analyze the life of any being into its constituent factors. As his science advances, he becomes more and more able to disengage any one of these factors from the rest, and so to study it by itself. He can already, as we have seen, study the complicated phenomena of the circulation of the blood, of respiration, of various kinds of movement quite apart from and independent of the presence of consciousness. As his knowledge widens and his means of research multiply, this power of analysis will grow more and more; and by-and-by, if physiology be allowed free scope for its development, there will come a day when the physiologist, in his experimental inquiries, will cause pain then, and then only, when pain is the actual object of his study. And that he will probably study best upon himself.

At the present day, the greatest amount of pain to animals is probably caused in experiments which perhaps hardly come under the title of vivisection—experiments in which the effects of starvation or of insufficient food, or the actions of poisons, are being studied. These, however, lead to valuable results. The pain which is the greatest in amount, and the least worthy in object, is the pain which comes to animals whose bodies have been used as tests to ascertain the poisonous nature of some suspected material; but this is a matter of the witness-box, not of physiology.

We may conclude, then, that physiologists are the cause to animals of much death, of a good deal of slight pain, and of some amount of severe pain. A very active physiologist will, for instance, in a year, be the means of bringing about, for the sake of science, as much death as a small village will, in a week, for the sake of its mouths and its fun, and will give rise to about as much pain as a not too enthusiastic sportsman in a short sporting season.

We have now to ask: What justification does he plead for this death and this pain? What good to mankind is thereby wrought which could not otherwise be gained?

His answer is, that the science of physiology is thereby advanced; that our knowledge of the laws of life has, in the main, been won by experiments on living animals. He, of course, cannot, and no one can, tell the "might have been." Without any such experiments, physics and chemistry, aided by mathematics, might have synthetically resolved the problems of life (though even then it might be said that both physics and chemistry sprang from the older biologic lore, and not so long ago a common physiological preparation, the muscle and nerve of a frog, started a new epoch in physics); but, as a matter of history, experiments on living animals have been the stepping-stones of physiological progress.

The great Vesalius, the founder of modern anatomy, turning his thoughts to the uses of the structures he had so well described, saw clearly that the problems opening up before him could be settled only by vivisection. In his great work, "De Corporis Humani Fabrica," may be read the evidence, not only that he performed experiments on living animals, but that, had he not in so inscrutable a way forsaken the arduous pleasures of learning for the gossip of a court, those experiments would have led him up to and probably beyond the discovery which years afterward marked an epoch in physiology, and made the name of Harvey immortal. He, indeed, sowed the seed whose fruit

Harvey reaped. The corner-stone of physiology, the doctrine of the circulation of the blood, was not built up without death and pain to animals. To-day, it is true, much of the evidence touching the flow of blood may be shown on a dead body, yet the full proof cannot be given even now without an experiment on a living creature; and certainly Harvey's thoughts were guided by his study of the living, palpitating heart, and the motions of the living arteries, quite as much as by the suggestions coming from dead valves and veins.

After Harvey came Haller, whose keen intellect dispersed the misty notions of the spiritualists, and by the establishment of the doctrine of "irritability" laid the foundations of the true physiology of the nervous system: he too, in his work, wrought death and suffering on animals.

Another great step onward was made when Charles Bell and Magendie, by experiments on animals more painful than any of the present day, traced out the distinction between motor and sensory nerves; and yet another, When Marshall Hall and others demonstrated by vivisections the wide-spread occurrence and vast importance of reflex actions.

What was begun with death and pain has been carried forward by the same means. I assert deliberately that all our real knowledge of the physiology of the nervous system—compared with which all the rest of physiology, judged either from a practical or from a theoretical point of view, is a mere appendage—has been gained by experiment, that its fundamental truths have come to us through inquiries entailing more or less vivisection. By meditating over the differences in structure visible in the nervous systems of different animals, a shrewd observer might guess at the use of some particular part; but till verified by experiment, the guess would remain a guess; and experiment shows that such guesses may be entirely wrong. Where experiment has given a clew, careful observations have frequently thrown light on physiological problems. Without the experimental clew, the phenomena would ever have remained a hopeless puzzle, or have served to bolster up some baseless fancy. What disease, or what structure in what animal, could ever have made us acquainted with that "inhibitory" function of the pneumogastric nerve which the vivisectional experiment of Weber first detected? What a light that one experiment has thrown on the working of the nervous system! What disease could have told us that which we have learned from the experiments of Du Bois-Reymond and of Pflüger? Where would physiological science be now if the labors of Flourens, Brown-Séquard, Schiff, Vulpian, Goltz, Waller, and others, were suddenly wiped away from the records of the past? Yet each of

these names recalls long series of experiments, some of them painful in character, on living animals.

I repeat, take away from the physiology of the nervous system the backbone of experimental knowledge, and it would fall into a shapeless, huddled mass.

The chemistry of living beings, one would imagine at first thoughts, might be investigated without distressing the organisms which formed the subjects of research. The labors of Lavoisier and Priestley, who first made clear the chemistry of respiration, if they entailed no use of the knife, caused at times a no less painful suffocation; while the great advances which have been made in this branch of the study during the last quarter of a century, and are still being made, necessitate almost daily vivisection, in order that the gases of the blood may be studied in exactly the same condition as they are in the living body. Even still more bloody has been the path by following which we have gained the knowledge we now possess of the chemistry of digestion and nutrition. I have only to mention the names of Bidder, and Schmidt, and Bernard, to call to the mind of the physiological student important results, nearly all reached through vivisection. The shifts and changes of the elements within our body are too subtile and complex to be divined from the results of the chemical laboratory; the physiologist has to search for them within the body, and to mark the compounds changing in the very spot where they change; otherwise all is guess-work.

Among the labors of the present generation, none perhaps have already more far-reaching results, none hold out more promise of fruit in the future, than those which bear on the influence of the nervous system over the circulation of the blood and over nutrition. The knowledge we are gradually acquiring of the subtile nervous bonds which bind together the unconscious members of the animal commonwealth, which make each part or organ at once the slave and guardian of every other, and which with cords of nervous sympathy draw each moiety of the body to work for the good of all, is putting a new aspect on physiology, and throwing many a gleam of light into the very darkest regions of the science. The words "inflammation" and "fever," bandied about of old as mystery-words, sounding much but signifying little—shuttlecocks tossed to and fro from one school of *doctrinaire* pathologists to another—now at last, through the labors of modern physiology, seem in a fair way of being understood. That understanding, when it is complete, will have been gained step by step through experiments

on living animals, one of the first of which was Claude Bernard's research on vaso-motor nerves.*

There still remains the question, What good does physiology bring to mankind? Of the value of physiology as a not insignificant segment of the circle of universal knowledge, nothing need be said; where saying aught is necessary, it would be useless. Nor need much be said concerning the practical value of physiology as a basis for the conduct of life. So long as men refuse to learn or to listen to physiology in order that they may the better use their bodies, it would be hopeless and useless to talk of the day when they may come to it for instruction how to form their minds and mould their natures. It will be enough for my present purpose to point out briefly the relations of physiology to the practical art of medicine.

These are twofold. In the first place, the medical profession is largely indebted to physiology on account of special discoveries and particular experimental researches. If we regard the profession simply as a body of men who possess or should possess a remedy for every disease, this may seem an exaggerated statement. Many of the remedies in use or in vogue at the present day have been discovered by chance, borrowed from ignorant savages, or lighted on by blind trials. Physiology can lay no claim to the introduction of opium or quinine. Where specific remedies have been suggested by physiological results or theories, it has not seldom happened that the remedies, though useful, have been given for a wrong reason, or have done good in a way which was not expected.

But if we look upon the medical profession as a body of men, cunning to detect the nature and to forecast the issues of the bodily ills under which we suffer, skillful in the use of means to avoid or to lessen those ills, rich in resources whereby pain is diminished and dangerous maladies artfully guided to a happy end, then we owe physiology many and great debts. Did the reader ever suffer, or witness others suffer, with subsequent relief, a severe surgical operation? If so, let him revere the name of John Hunter, the father of modern surgery. But

*The great importance of the vaso-motor system justly led Mr. Huxley to introduce into his "Elementary Lessons in Physiology" Bernard's fundamental experiment with some such words as "a rabbit may be made to blush artificially by dividing the sympathetic nerve." A writer, apparently biased by the memories of his own boyhood, has accused Mr. Huxley of thereby dangerously inciting boys and girls to cruelty, as if the division of the sympathetic nerve were the sort of thing a school-boy might do with a pocket-knife and a bit of string. Is it any use to enlighten the malevolent ignorance of such minds by telling them that many physiological experiments require such skill and care as make ordinary surgical operations seem rough and easy proceedings?

Hunter was emphatically a physiologist; his surgery was but the carrying into practice of physiological ideas, many of which were got by experiments on living animals. Does the reader know that in all great surgical operations there are moments of imminent danger lest life steal away in gushes of blood from the divided vessels, danger now securely met by ligatures scientifically and deftly tied? Does he know that there was a time when the danger was imperfectly met by hot searing-irons and other rude means, and that the introduction of ligatures, with their proper application, is due to experiments, cruel experiments, if you like, on dogs and other dumb animals, experiments eminently physiological in their nature, about which much may be read in the book of "Jones on Hemorrhage"? Even now, year by year, the scientific surgeon, by experiments on animals, is at once adding to physiological knowledge and bettering his treatment of wounded or diseased arteries. Has the reader seen any one once stricken by paralysis, or bowed down by some nervous malady, yet afterward made whole and brought back to fair, if not vigorous, health? The advice which turned such a one toward recovery was based on knowledge originally drawn from the vivisectional experiments of physiologists, and made safe by matured experience. Or has he watched any dear friend fading away in that terrible malady, diabetes, after rejoicing that for a season he seemed to be gathering strength and ceasing to fail, even if not regaining health? The only gleam of light into that mysterious disease which we possess, came from the vivisectional researches of Claude Bernard on the formation of glycogen in the liver; and by judiciously acting upon the results of those researches the skillful physician can sometimes stay its ravages. He cannot cure it even now; and unless some empiric remedy be found by chance, will never cure it, until, by the death of many animals in the physiological laboratory, the mystery of the glycogenic function of the liver be cleared up.

But why need I go on adding one special benefit to another? They may all be summed up in one sentence, which embodies the whole relation of physiology to the medical profession.

The art of medicine is the science of physiology applied to detailed vital phenomena by the help of a wisdom which comes of enlightened experience, and an ingenuity which is born of practice. Were there not a single case on record in which physiology had given special and direct help to the cure of the sick, there would still remain the great truth that the ideas of physiology are the mother-ideas of medicine. The physi-

ologist, unincumbered by the care of the sick, not weighted by the burden of desiring some immediate practical result, is the pioneer into the dark places of vital actions. The truths which he discovers in his laboratory pass over at once to the practitioner, busy in a constant struggle with the puzzling complexity of corporeal events ; in his hands they are sifted, extended, and multiplied. The property of the physiologist alone, they might perhaps lie barren ; used by the physician or surgeon, they soon bear fruit. The hint given by a physiologist of the past generation becomes a household word with the doctors of the present, and their records in turn offer rich stores of suggestive and corrective facts for the physiologists of the generation to come. Take away from the practical art of medicine the theoretical truths of physiology, and you would have left a crowd of busy idlers in full strife over fantastic ideas. The reader has laughed with Molière over the follies of the *doctrinaire* physicians of times gone by. He has to thank experimental physiology that he has not the same follies to laugh over and to suffer from now. The so-called practical man is ever prone to entangle himself in and guide his conduct by baseless speculations. Such has been the case with medicine. The history of medicine in past centuries is largely occupied with the conflicts of contending schools of pathology—schools which arose from this or that master putting forward a fancy, or a fragment of truth, as the basis of all medical judgment. These have given place in the present century to a rational pathology, which knows no school and swears to the words of no master, but is slowly and surely unraveling, bit by bit, the many separate tangled knots of disease. They have given place because men have come to see that maladies can only be mastered through a scientific comprehension of the nature of disease ; that pathology, the science of disease, being a part of, is inseparable from, physiology, the science of life ; that the methods of both are the same, for in each a sagacious observation starts an inquiry, which a well-directed series of experiments brings to a successful end.

Many, if not most of these experiments, must be made on living beings. Hence it is that animals are killed and suffer pain, in order that physiological knowledge may be increased, and disease made less.

Take away from the art of medicine all that with which physiology has enriched it, and the surgeon or the physician of to-day would be little better than a mystery-man, or a quack vender of chance-gotten drugs. Take out of the present system of physiology all that has been gained by experiments on living animals, and the whole structure would collapse, leaving nothing but a few isolated facts of human experience.

As far as we can see, what has been will be. The physiology of the future, if not hampered by any ignorant restraint, will, out of the death of animals, continue to press further and further into the mystery of— and year by year bring the physician, and not the physician only, but every one, power to prolong, to strengthen, and to purify—the life of man. By no other way can man hope to gain this end. He is thereby justified for the death he causes and the pain he gives.

We have yet to consider this question in its other aspect; we have to examine not only the effects of vivisection as far as animals are concerned, but also its influence on man himself. Little, however, need be said. Necessary vivisection, we have shown, cannot be called cruel. The question of the necessity of any particular case can only be judged by the investigator himself. I content myself with asserting that any attempt to draw up, for the guidance of others, a general definition of necessary and unnecessary vivisection, must prove utterly futile. Only he who is making an inquiry knows his own needs. If he experiments recklessly and needlessly, he becomes cruel, and, being cruel, will thereby be the worse. But if he experiments carefully and heedfully, never causing pain where it could be avoided, never sacrificing a life without having in view some object, to attain which there seemed no other way, remembering that whoever "tortures" either dead or living nature carelessly will get no true response, there is no reason why his moral nature should suffer even ever so little tarnish. On the contrary, experience teaches us that earnest physiologists, who have killed animals in the single hope of gaining new truths or of making old ones plain, have grown more gentle and more careful the longer they worked and the more experiments they made.

The effects of vivisection on the moral nature of man may fairly be tested by experience. There are in this country several physiologists— myself among the number—who have for several years performed experiments on living animals. We have done repeatedly the things which a distinguished lady has seen fit to say "are best spoken of as nameless." I can confidently appeal to all who know us, whether they have seen any deterioration in our moral nature, as the result of our work; whether we are to-day less careful of giving pain than we were when we began to experiment; whether they can trace in us any lessening of that sympathy with dumb animals which all men should feel, even in the very thickest of the struggle for existence.—*Macmillan's Magazine.*

ENGLISH IDEA OF DENTISTRY.

We know that this subject is not a pleasant one, and yet it has its fascination. Most people have something to say about it, as about other subjects on which they have thought or felt, and ideas usually press for utterance in proportion as they are numerous and vivid. Knowledge which has been borrowed from books, or gathered in hours of dissipation, is communicated with carelessness, languor, and hesitation. But personal experiences of a nearer and profounder nature, which have absorbed one's whole attention at the time and left a deep impression behind them, cannot be recalled with equal indifference. Whilst they stimulate the whole mind to unaccustomed activity, persons not at other times noted for eloquence betray a sudden affluence of words, a surprising vigor of style, and unsuspected resources of illustration. Should a conversation begin to turn upon Dentistry, every one must have observed with what difficulty it is drawn away to some more cheerful, but less exciting, topic. Several persons talk at once, and though all profess to aid in the diversion, the subject has what psychologists call great "ideal persistence," dies hard, and tends to come to life again at intervals for some time after. In this respect it is like talking about ghosts in the dark, when there is a general sense of uneasiness and a general desire to pass to something else, but there is always some one with a more harrowing story than any which has yet been heard, which it is impossible to refrain from telling and impossible to refrain from listening to. Only there is this difference, that ghosts are now pretty well recognized as part of the popular *Aberglaube,* as Mr. Matthew Arnold would say, and the terrors they arouse within us are somewhat mild, even at midnight; whereas the existence of dentists may be verified—and indeed we often experiment on them, and they on us—so that they are placed far beyond the reach of skepticism, even at noonday. On this account they are the more interesting in a scientific age

It may seem that, since Dentistry is so familiar a topic, it must be needless to expatiate upon it, and certainly to say anything strikingly novel about it is more than can be reasonably hoped. But we remember that Dr. Johnson praises Gray's "Elegy in a Country Churchyard" on this very ground, that it contains nothing new, but only what had previously occurred to every one else ; and to attain as great a reputation as that celebrated piece ought to content a moderate ambition.

Moreover, to say what has previously occurred to every one else has the advantage that it assures you of the sympathy of your reader, if you should be so fortunate as to secure one. Now it has probably occurred to most people that Dentistry is about the least enviable of professions. It is not merely the character of the work that makes it so, for all professions have unpleasant associations to which their members are inured by custom : taste is proverbially arbitrary ; and it is even intelligible that a man who has the gift of delicate manipulation may feel attracted to a pursuit which affords so many opportunities for its exercise. But it is the feelings with which a dentist is regarded by his patient, which, if he knew them, would render his position so peculiarly uncomfortable. A man may suffer many things of his doctor, and still regard him with gratitude and friendship. He may be ruined by lawyers without conceiving any personal antipathy toward the practitioners whom he has injudiciously employed, but may content himself with indulging in a diffused hatred of the law as a whole, and whatever has to do with it, and vent his rage in vague maledictions against lawyers in general, which can only have a very harmless incidence upon any one in particular. But let him once go to a dentist, and he is likely to come away with a definite and abiding horror of that dentist himself, and not another. It is notorious that many people dread to meet their dentist in the street. If they do meet him they are variously affected, according to temperament. Some can scarcely restrain themselves from headlong flight, others are ready to faint on the spot; a few involuntarily clench their fists, the blood rushes to their faces, and they feel prompted to assault him. But these last are few indeed. Most of us are at once "Gorgonized" out of all thought of active resistance, and even the idea of escaping dies ineffectually within us. In agricultural ages, and still in country districts, the enraged bull plays a prominent part in nightmares, but this traditionary bugbear is threatened to be supplanted. In future people will eat a heavy supper with the prospect of passing an uneasy night in that curious and complicated piece of mechanism, the dentist's arm-chair; holding on firmly by the bottom, now being screwed up, now down, to get a favorable light; their heads rolled to this side or to that to meet the exigencies of art, whilst the peering eyes of their favorite operator come and go, and a confused clatter of steel is heard during the intervals.

And yet the dentist does not seem to deserve so hard a fate. Divested of the terrors with which imagination clothes him, he is seen to be our own flesh and blood. A judicious blending of mildness with

firmness appears to be necessary to the ideal character of his profession, and it is remarkable how many members of the profession realize this ideal, or make laudable approximations to it. Sometimes, indeed, a falling away from the standard may be noticed in either direction. Excessive sympathy may lead a dentist to sacrifice firmness to mildness, and this perhaps is the worst error of the two. For he ought to consider his patient's condition; how distracting pain renders it difficult for him to make up his mind, or else prompts him to determine rashly; how, too, he is probably quite ignorant of the true cause of his suffering, and equally ignorant of the proper remedy. It is therefore the part of a good practitioner to decide for him, and, if the worst must come and the last office be performed, to jog the elbow of his resolution. But other practitioners are either so sensible of this, or are of such an autocratic disposition—so determined at any rate to have the game (if the expression be allowable) in their own hands—that, sacrificing mildness to firmness, with harsh voice and rough manner they bully and intimidate their patients, as though the latter were not abject enough already, or as though the dread and fear of dentists needed any adventitious aid. The cunning middle course, however, seems to be this—knowing what treatment is best for the patient, to get him to adopt it as if of his own choice. He is then buoyed up and consoled during the operation by a flattering sense of mild heroism, whilst, if anything should go wrong, the operator is to a great extent absolved from blame. And to do this well, a character of mingled mildness and firmness, with some knowledge of human nature, is best adapted. And there is no profession in which the knowledge of human nature in relation to physical pain may be sooner gained, on which account dentists acquire earlier than other men a wise tolerance of human frailty.

It is said that women bear going to the dentist's better than men; and the reason of this seems to be the same as that of their more patient endurance of many other bodily ailments. For during illness men are more fidgetty and morose than women, because they are accustomed to greater activity, have a stronger passion for freedom, and feel the restraint of helplessness more oppressive. And if, when the worst has come, at the dentist's, seated in the chair of fate, with the last agony imminent, any one retains enough presence of mind to attend to his own emotions in those trying circumstances, he will confess, we believe, that the actual pain is not worth making a fuss about, but that the intolerable part of it is—oh for a euphemism!—in plain English, it is the submitting to the first grip and putting oneself so utterly in another

man's power. It is this "representative" element of the torture that puts our virtue to the test; and let none pretend to make light of it. But fortunately it is of short duration, and is far better than the malady it cures. So that a man's loyalty to reason may almost be measured by his willingness to go to the dentist's when his time has come. No imaginary horrors deter the sane man, but he goes into the very chamber of horrors, like Rinaldo into the enchanted wood. And ever after, when passing the house, he will say to himself, "I have been there, and still would go, on sufficient occasion."

Certainly a good dentist deserves to be called the Friend of Man. And therefore we read with pleasure in the "Medico-Chirurgical Review" that during the last ten years no branch of surgery has made so much progress as Dentistry has done; for during many dark ages, with respect both to science and to practice, it was in a very backward state. Not very long ago, it is averred, blacksmiths were much in favor as operators in this department—a fact which seems to require explanation. It will perhaps be surmised that they were recommended for their work by their great bodily strength. But the obviousness of this account of the matter is delusive; the true theory must be sought in a more roundabout way. And if, in the first place, we remark that the blacksmith anciently discharged the functions of a farrier, perhaps this will be thought not to cast much light upon the subject, but rather itself to need illumination. Remembering, however, that to the minds of our forefathers the offices of barber and surgeon seemed naturally to go together, we cannot be surprised that to the same minds it should appear part of the fitness of things that the blacksmith who shoed a horse should also doctor it. And now, as Mr. Spencer would say, observe the implication. In doctoring a horse it must sometimes have been necessary to extract a tooth, and it was at once inferred that he who could extract a horse's tooth *à fortiori* could draw a man's. And that he did often draw, to admiration, both the tooth and the man, may be imagined. Figure the blacksmith with his patient careering round and round the forge, emulating the dealings of Achilles with Hector, and then listen to those who deride what they call the merely material civilization of the present day. Great is the transition from the blacksmith's shop to the modern dentist's ingenious arm-chair—we had almost written easy-chair. On the other hand, it may be that the need of dentists has much increased with civilization. It is commonly believed that savages have excellent teeth; and although we are now-a-days in the habit of suspecting such beliefs, this one seems probable, if we consider how necessary

good teeth are to them. To any one who is anxious to prove "material civilization" a mistake, the inquiry may be suggested, What effect has the invention of knives and forks had upon the teeth of those nations that have condescended to adopt the use of them? For these pernicious utensils plainly render good teeth less a necessary of life than they were before, so that people with bad teeth now survive, transmit their degenerate natural weapons to their descendants, and so on. And, therefore, to Mr. Galton and others who are anxious to guard the interests of the future by promoting marriage on scientific principles, we may suggest the propriety of including sound teeth in the list of excellences required of those about to marry. The priest or registrar might call upon the parties to a proposed marriage to produce, among other certificates, one showing that they themselves had sound teeth, and likewise their fathers and mothers, their grandfathers and grandmothers, and such other relatives as the *savans* may think a sufficient guarantee against reversion. Or perhaps these matters are to be left to the young people themselves, and a man's asking a girl if she has ever suffered from toothache may one day be a recognized way of hinting that he is coming to the point.

But if such means of securing the peace of posterity fail, others may be devised. Amidst the press of unexpected ideas, projects, and events, it is daily becoming more difficult to detect an absurdity at first sight; and so the following ingenious speculation which has been started may yet be realized. What if, hereafter, every one on arriving at a certain age should be bound to yield up the natural teeth, and receive in exchange an artificial set warranted not to ache, and which might be renewed from time to time in case of their ceasing to fit, being swallowed, stolen by garotters, or other accidents which already are not unexampled? It would demand some courage, perhaps, once in a lifetime, but that must be better than once a year, as at present. Besides, are there not anæsthetics? And, moreover, stern laws, backed by a public opinion instructed in what truly makes for social welfare, would, as in Sparta, deter the youth from showing the white feather, and they would sit down smiling; just as some tribes of American Indians with whom beards are unfashionable, on reaching the age when rudiments of beards appear, submit, it is said, to have them plucked out hair after hair by squaws, and account it a virtue not to groan or wince, though they are the old squaws who do it. By thus losing all our teeth at once, and as a matter of course, we should no longer be haunted by the regretful feelings which now disturb us, as wandering about the world,

visiting many cities, and perhaps many dentists, we drop them as pledges of mortality, one here and another there, and already, long before death, reflect that our bones lies scattered on every shore. And this will be a relief to many persons; for how imagination follows those fragments of our being, whoever is familiar with folklore knows well.

We have said, perhaps somewhat hastily, that dentists are our own flesh and blood; but at any rate this acknowledgment does not extend to those dentists who put horrible signs of their profession outside their houses in the public streets. What we refer to is too hideous to describe with decency, but every one must understand us. Such things can only be in place in a scientific museum. The only device to be compared to this one is the pirate's flag with its skull and cross-bones, but the flag is much the less revolting of the two. We should have thought such a mode of advertising would have been considered unprofessional, and we are sure it cannot be attractive.—*London Saturday Review.*

OXYGEN GAS AS A REMEDY IN DISEASE.

From New York Medical Journal.

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CHAPTER V.

THE USE OF OXYGEN IN DISEASES INVOLVING DEFECTIVE NUTRITION.

The benefit derived from the use of oxygen, in cases not primarily involving respiration, is to be explained on the principle that it aids defective nutrition. The replacement of old and effete matter by that which is new and active, is fully as much the work of respiration as of digestion. Without the oxygen derived from respiration, *tissue change* would be immediately checked. If the blood did not convey to the tissues the requisite supply of oxygen, the gastro-intestinal system might do its part, and the food might be absorbed, but there the process would be arrested. The material would be on the spot, but the structure would not be repaired. Nor is it enough to present the usual supply of oxygen to the blood in the lungs. The blood itself must be in a proper condition to receive it, or it cannot reach the tissues. The quality of the blood by which it takes up oxygen depends upon the exactness of its chemical constitution. A slight variation in this will

affect its absorbing power. But a condition of the blood which prevents the absorption of sufficient oxygen from the diluted medium usually respired, may allow its absorption from a medium in which a greater proportion of oxygen is contained. A deficient absorbing power may be supplemented by an increased supply of the material to be absorbed.

It is on this principle that even a very small quantity of artificial oxygen inhaled each day is capable of producing such decided results in cases appropriate for its use. The deficiency of oxygen in the blood, and in the tissues, has been very gradually produced, and, once restored, considerable time will be required before the previous condition will again be reached, even if the cause by which it was produced continues operative. Thus, by daily inhalations, the normal condition may be, in a measure, restored and maintained, until Nature is enabled to resume her sway.

But there is one form of disease which at the same time depraves the blood and interferes with the function of the lungs, thus striking a double blow at the function of hæmatosis. It may therefore be appropriately considered first, as intermediate between those cases in which respiration is principally involved, and those in which nutrition is chiefly at fault.

Phthisis.—Among chronic diseases, pulmonary phthisis was the one which offered from the first the most tempting field for the use of oxygen. It was natural to expect that the profound dyscrasia which lay at the root of the disease might be favorably modified by an agent bearing such intimate physiological relations to the normal blood. At the same time there was room to look for a double local action within the lungs. What might be the result of bringing an excess of free oxygen into direct relation with the tubercular matter in the pulmonary tissue, was a question not less interesting than what might result from the local action of the gas upon the ulcerated surfaces with which it would come into contact.

After the lapse of eighty years these problems still remain but partially solved. With regard to the effect of oxygen upon the system generally in phthisis, we have abundant evidence to show that, *as a rule*, in this disease, as in others in which nutrition is defective, the use of the gas *favors assimilation and results in a gain in weight.* But whether it exerts an influence upon the morbific principle which constitutes the essence of the disease, is a point which facts alone can determine, and up to the present time sufficient facts have not been gathered to warrant a decided answer.

The observations of Hill, Thornton, and others, in the latter part of

the past and the early portion of the present century, were made before the days of physical exploration of the chest, and their results are, therefore, of little real value. They report a number of cases very decidedly benefited, but we cannot be sure that they were instances of genuine phthisis. Since the time of Laennec, we have only isolated cases here and there, in which the gas was given for a few weeks, or at most two or three months, and generally without a very close study of the physical signs. Still, among these cases there is considerable reliable evidence to show that oxygen may sometimes arrest the progress of this disease for a considerable period, and possibly eradicate it altogether. What is required, however, is that a large number of patients in some public hospital should be under careful observation for some time, in order to ascertain their real condition and the progress the disease is making, and that the oxygen should then be administered several times a day, and the physical signs watched by a competent observer. Until this is done, neither the general effect upon the dyscrasia nor the local effect upon the lung can be satisfactorily appreciated. Theoretically there is much to encourage to such a trial. First, we have the fact that in phthisis the nutrition is faulty to a degree that has given the disease its name, and the correlative fact that oxygen promotes nutrition in a remarkable manner. Secondly, we know that an impure atmosphere promotes phthisis, and that persons whose occupation keeps them constantly in the open air rarely become phthisical. Thirdly, modern chemistry teaches us that oxidation is the first step in the metamorphosis of tissue which precedes its resorption, as it is the first step in the decay and disintegration of dead organic matter. It is reasonable, therefore, to suppose that the presence of free oxygen in contact with tubercle would initiate a process of disintegration which would favor its absorption. How far the few clinical facts on record bear out this reasoning will be seen hereafter.

Lastly, numerous experiments show that oxygen in contact with a wound or ulcer acts as a stimulant, promoting the formation of granulations, and, if carried too far, setting up active inflammation. We have in this fact at once a therapeutical indication, and also a possible solution of the want of success which has often attended the use of oxygen in phthisis, especially in the advanced stages. As a solution of nitrate of silver of appropriate strength, applied with discrimination, facilitates the healing of an external ulcer, so oxygen, properly diluted and carefully employed, may have a healing effect upon ulcers of the lung. But as a strong caustic applied indiscriminately to external ulcers would often induce excessive action, so oxygen in excessive pro-

portion may excite inflammatory action in ulcers of the pulmonary tissue, which, reacting upon the general system, would produce fever and other symptoms apparently indicating an aggravation of the general disease. These considerations show how far we are from a knowledge of the possible usefulness of oxygen in this dread disease. The effects heretofore obtained have resulted from a hap-hazard use, such as in the case of any other remedy would have insured its total failure. Only when we learn to use it with the same discrimination and care that we exercise in the use of opium or strychnia, shall we know the limit of its power for good. The quantity and the mode of administration should be regulated by the actual condition of the lung. In the first stage, when we may assume that the mucous surface is entire, the gas may be given with impunity, diluted with two or three times its bulk of air, but even then the symptoms should be carefully watched, and especially the temperature and anything indicating the occurrence of local inflammation should be the signal for further dilution of the gas. There is no necessity for adding to the inspired air more than three or four per cent. of oxygen in order to produce a decided effect upon nutrition by one or two inhalations daily of half an hour's duration each. An atmosphere of this kind could have no appreciable local effect, even upon an ulcerated surface.

When there is profuse purulent expectoration, or when the signs indicate the existence of cavities, the local effect of oxygen but little diluted might be cautiously tried. In such cases the expectoration will sometimes rapidly diminish. This is notably the case in chronic bronchitis, and it is probable that some of the favorable cases reported by early observers were instances of this disease rather than of phthisis. But there are cases on record in which oxygen has been for a time beneficial, but after a few weeks has produced the symptoms of local inflammation. It is probable that the action in these cases was the same as that observed when ulcers on the surface have been exposed to the direct contact of oxygen. For a time the ulcer improves, the indolent character is lost, granulations spring up, and cicatrization commences. But soon the action becomes excessive, and inflammation results. By diminishing the action in time, this effect would be avoided and the benefit already procured would be retained. A like management in the case of phthisis would probably have obviated the difficulty.

The use of oxygen in phthisis need not exclude any of the usual remedies employed. On the contrary, such of them as undergo a process of digestion and assimilation, as, for example, cod-liver oil, would doubtless be more efficacious for being associated with the gas.

I have been able to collect the histories of a considerable number of cases of phthisis in which the use of oxygen was beneficial. I will mention the leading points of some of these, referring the reader to the original source for details, which would occupy too much space.

CASE I.—Reported by Demarquay (p. 733). X——, aged thirty-two. Tubercles in both lungs ; cavity in left, of the size of an egg. Greatly emaciated, pale, anæmic, profuse expectoration, intense fever in the afternoon, diarrhœa. Tubercular epididymitis. *March 1st.*—To take four litres of oxygen in ten of air, daily. *March 3d.*—The cough is less frequent, expectoration less abundant ; slept well. Increase the dose to twelve litres. *4th.*—A little appetite, but little cough, no expectoration. *6th.*—Great appetite, sleeps well, physiognomy better. *8th.*—Increase to fifteen litres. *10th.*—Patient has been up and about for the last two days. Appetite so great that, after eating the dinner provided by the institution, he goes out and dines again in the city. Face has more color, cheeks filling out. Respiration easier. *16th.*—Cavity still remains, but the surrounding tissue which was hepatized now performs its function. *19th.*—Able to take a long walk. *26th.*—Cough and expectoration have entirely disappeared. No gurgling as formerly, respiration still amphoric.

April 30th.—Discharged in a very satisfactory condition.

CASE II.—Demarquay (p. 736). Madame De B., aged twenty-seven. Tubercles in both lungs. Emaciation, frequent cough, profuse expectoration, almost no appetite, abundant night-sweats. The appetite improved and the strength increased, and, on the twenty-seventh day of the treatment by oxygen, patient was able to give a dinner-party and preside for two hours at the table. The menses, which had been absent for five months, returned. The cough and expectoration, though less, persisted during the summer and toward autumn ; the use of the gas having been for some time suspended, a relapse took place, and death followed the ensuing Feburary.

It is to be remarked that in this case all other treatment was suspended from the moment the use of the oxygen began.

CASE III.—Reported by M. Monod (quoted by Demarquay, p. 739). M. C. B., aged twenty-six. For some years has had very abundant hemorrhages. Signs indicate a number of cavities and an abundant deposit of tubercle, especially in right lung. At the commencement of treatment was so feeble that he could only be moved from the bed to the sofa. Abundant muco-purulent expectoration, complete anorexia. Twelve litres of oxygen were given twice a day, and within a brief period he had so far improved that he was able to walk in the garden, and

even to attend occasionally to business. For sixteen months the treatment has been continued, during which time there has been no return of hemorrhage. The expectoration is now insignificant, and the cough infrequent. The appetite is habitually good. Still the disease is making progress, the pulse is frequent, and the strength less than last year. But the oxygen has restrained the march of the disease, which last spring seemed to have arrived at its last stage. The improvement followed so immediately upon the administration of the gas that it could not be attributed to any other cause.

Demarquay quotes, from notes furnished by M. Hervé de Lavour, an account of that gentleman's experience with oxygen in phthisis which is particularly valuable, as he gives the unfavorable as well as the favorable results. He says: "I have had only nine patients who have been submitted to a somewhat regular course of inhalations of oxygen. Among this number I have obtained three remarkable successes. The first was a phthisical case of old date, having enormous caverns at the summit of one lung, and who, at the time I prescribed the inhalations, had an abundant expectoration, fever in the afternoon, a frequent cough, and such a degree of dyspnœa as rendered the least movement fatiguing. Anorexia was complete. The inhalations of oxygen were prescribed at the dose of fifteen litres" (four gallons) "daily in two portions, mixed with about one-third of common air. Gradually the quantity of gas was raised to forty-five litres daily, taken pure in two doses. Under this influence the expectoration ceased, the appetite returned, and the patient began to convalesce. The gas was continued two months, when the dose was diminished gradually and finally discontinued. For the last five months the patient has gained flesh, follows his usual occupations, and goes on as well as possible."

(To be continued.)

DECAY OF TEETH DURING PREGNANCY.

The very rapid decay of the teeth of females during pregnancy, is a condition that has long been observed by both physicians and dentists, but the *cause* of this condition of these important organs has not been accounted for by writers on the diseases of the teeth, or those on the diseases of the system generally. Its pathology appears to be among the unrevealed phenomena, so far as the writer is aware, not having met in his professional reading any theory fully accounting for the very general

state of decay found in these organs, and as a consequence, the very frequent extraction rendered necessary during the period of gestation. There may be a more *active* connection of the nervous system of the uterus with the dental nerves, and that condition may account for the *ache* at this particular period, but the question of *cause* is still in abeyance.

In a paper read before the South Carolina State Dental Association, in June, 1873, the subject was referred to, and the hypothesis suggested, "that the decay may be caused by the demand on the osseous system of the parent, for the constituents for the formation of the bony structure of the embryo being, and the blood not furnishing the requisite supply, the teeth being more highly endowed with the phosphates than the other portions of the system, were drawn upon to supply the deficiency. Yielding a large portion of their constituents, they were deprived of the ability to resist the destructive influence of the vitiated fluids of the oral cavity (which are doubtless more vitiated at this period), and consequently decay more rapidly."

The foregoing appears as near a theory for the decay of the teeth at the period named, as any other that the writer has known to be offered to account for this disease of the teeth. It may be decidedly objectionable in a scientific point of view, but the subject is one full of interest to the profession, and of especial importance to all those females who are "as ladies wish to be who love their lords," although the interesting condition may necessitate them to "the loss of a tooth for a child."

Quite recently the writer observed in Johnstons' DENTAL MISCELLANY, reference to some remarks by Dr. Hawes, of Boston, before the Massachusetts Dental Society on this question. The Doctor stated as his opinion, "that the decay is traceable to inter-uterine disturbances. The abnormal condition of the pelvic organs of the female, acting through the digestion, was the cause of the marked decay of the teeth in females during pregnancy." Whether this or the previous hypothesis touches the true cause is a question that may well entertain the time and the talents of the profession in the numerous Dental Associations of the country, and the Schools of Education.

As this is a very progressive age, and as I have not been well posted in the professional publications of the day, I may be mooting a point already in a measure settled. It will be gratifying to learn that such is the case. M. B.

CAMDEN, S. C.

NOTES.

Odontological Society.

Since the report of the meeting of the Odontological Society was electrotyped, a committee of the Society request us to say that:

"The report is an abstract of a paper and remarks by Dr. Palmer, before the Odontological Society, and which he illustrated by drawings and models. Dr. Palmer declines to furnish these illustrations for publication, and the committee feels compelled to make this statement in connection with the publication of the report."

We add that Dr. Palmer was invited to furnish us his drawings to illustrate the report, but said that he could not now possibly find time to prepare them properly for the engraver. We regret this, but think the intelligent reader will not fail to understand Dr. Palmer's able paper.—Ed.

Progress of Science.

Philadelphia holds her own handsomely, in the field of medical and surgical science. And she makes advances which are very important. The Dental Colleges have made a move in a direction which marks the progress of dental science in a striking manner. It is within the recollection of everybody now of middle age, when there was no such thing as dental surgery that could pretend to any scientific position. But the study of the diseases and treatment of the teeth has enlisted the brightest intellects and developed itself into a skill in practice which has raised what was formerly nothing more than a mechanical process to the dignity and importance of a scientific pursuit. So that the time has come for dental surgery to protect itself against ignorance and quackery by the same safeguards that medicine has drawn around itself, and the Legislature of Pennsylvania has been asked to pass a law making it unlawful for any person to practice dentistry in the State of Pennsylvania, unless such person has attended a regular course of lectures in a reputable Dental College, duly incorporated under the laws of this, or some other State of the United States or foreign country, and has received the diploma. The proposed law does not apply to persons now engaged in the practice of dentistry in this State. Any person engaging in the practice of dentistry without having complied with the regulations of this act, is to be deemed guilty of a misdemeanor, and, upon conviction thereof, fined not less than fifty dollars nor more than two hundred dollars for each offence.

J. McQ.

Women Dentists in Germany.

When Mrs. Dr. Hirschfeld graduated in Philadelphia and returned to Berlin to practice dentistry, her effort was pronounced an experiment and a humbug that would find no imitators. On the contrary, her success has been so extraordinary that since that time, four years ago, she now stands very near the fulfillment of her wishes of founding a female college, where the long neglected duty of proper attention to children's teeth may be thoroughly studied. Following Mrs. Hirschfeld's example, three other ladies have been to America, graduated with the highest honors, and returned to the practice of their profession in Germany. Two were received with the greatest enthusiasm at their homes in East Prussia, and the third fraulein, Dr. Jacoby, is now in partnership with Mrs. Hirschfeld, whose business was larger than she could possibly attend to. Fraulein Jacoby is another example showing whether women are capable of the same amount of study as men; only one young man in the graduating class in Baltimore reached the same high number with Miss Jacoby.

[*Cincinnati Gazette.*

THE

Morrison Dental Chair.

Price, $150.00. Boxing, $5.00. Spittoon Attachment, $8.00.

It possesses great superiority over any chair before offered to the profession, and is at the same time less expensive than any other first-class chair. Some of its points of superiority we here enumerate :

1st. All the advantages of any low-based chair, and also of any high-based chair, are here secured in a single chair. In it the patient can be placed lower than in the lowest-based chair made, or higher than in any other of which we have knowledge. At its lowest position the seat is fifteen inches, and at its highest position forty-two inches above the floor.

2d. The operator using the Morrison Chair can either stand or sit at his work, as he may choose, working with equal convenience in either position.

3d. It has been a very general complaint that dental chairs are too wide at the back, so holding the operator away from his work. Here this difficulty is overcome. The chair is narrow at the back, so that the operator need not stretch to reach the patient, but *can lower either arm of the chair out of the way* and so be as near the patient as he may choose.

4th. It can be changed from its lowest to its highest position in seven seconds—a celerity impossible in any chair raised by a screw.

5th. It can be very readily and perfectly adapted to operations on children of any age

First. Because in it the child can be raised as high as needed for the tallest operator.

Second. It provides a comfortable back and head rest, exactly as for grown persons.

Third. The footstool can be lengthened or shortened, to suit children of any size.

6th. The back of the chair can be lengthened or shortened rapidly and at will.

7th. The lower part of the back can be thrown forward to support the small of the patient's back.

8th. The chair, when adjusted to any position, is firm or steady wherever placed, and this is *especially true of the head-rest.*

9th. It occupies less room than any other operating chair.

10th. Although the footstool, when at its extreme length, is much longer than any other made, yet a person of ordinary weight can stand on its extremity without tipping the chair.

Nota Bene.—We have substituted brass cogs and castings, for those that experience has shown in any degree faulty, and the chair, *as now sold, is as strong as any chair made.* Reference is made to this because several of the chairs first sent out, failed in the cogs by which the chair is raised, and in the castings which throw the lower back-pad forward. These have been replaced in every instance with brass cogs, without charge on our part, and to the complete satisfaction of the purchaser.

We are gratified in being able to refer to the commendations, which follow, from some of the leading practitioners of the country.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

---

10 W. 11*th St., New York, July* 24*th*, 1873.

MESSRS. JOHNSTON BROS., Broadway :

I find your Morrison Chair gives great satisfaction. My patients all admire, and voluntarily pronounce it the easiest they ever sat in. The movable back-piece, arms and foot-rest, which latter the patients can adjust at pleasure without changing their position, the lowering of the whole chair, which admits stepping into it without the slightest inconvenience, are points which call forth immediate praise from the patients, and give great satisfaction to the operator.

As a child's chair it is invaluable ; the little patients can be "put just where you want them," while the operator can with ease change the position of the *whole* chair, without disturbing the patient in the least. These points, combined with others which it has, make this chair the most desirable of any which I have seen. Very respectfully yours, A. L. NORTHROP.

JOHNSTON BROS., *Hartford, June,* 15*th*, 1873.

GENTLEMEN : I have used the new Morrison Chair several hours every day since its arrival here, and feel in duty bound to say that there is no chair manufactured that can compare with it.

Its adaptability to children as well as adults, support for the small of the back—in fact, all its motions are perfect, and I see no chance for improvement. Dr. Morrison and yourselves have my heartfelt thanks for the great benefits you have conferred upon the profession in perfecting the chair as well as the Dental Engine. Very truly yours, GEO. L. PARMELE, M.D., D.M.D.

MESSRS. JOHNSTON BROS., *Hartford, July* 24*th*, 1873.

DEAR SIRS : The Morrison Chair meets all my expectations. I like it very much : in fact, I feel perfectly satisfied that I have one of the most complete chairs yet made for the comfort of patients and the convenience of the operator.

Yours truly, JAS. McMANUS.

JOHNSTON BROS. *Bloomington, Illinois, July 18th, 1873.*

I am well pleased with the Chair. Think it equal to anything that has ever come before the profession. Success to the inventor and manufacturer.

J. CAMPBELL.

MESSRS. JOHNSTON BROS., *Bennington, Vt., July 7th, 1873.*

GENTLEMEN: The Morrison Chair is the best I have ever used, and the most comfortable for patient or operator.

Yours truly, J. N. SCRANTON.

MESSRS. JOHNSTON BROS. *New York City, July* 25th, 1873.

GENTLEMEN: I deem it a pleasure to add my testimony as to the merits of the Morrison Chair. How can the intelligent dentist afford to be without it? Some of its merits are: The many comfortable positions in which the operator can place himself while operating, especially the low sitting posture; also the rapidity of movement and quick adjustment of the essential positions of the Chair, and a very comfortable seat for the patient during an operation. The Chair itself is a beauty; thanks to the *inventor* and *manufacturer*, we now have a trinity in the dental world; *the Liquid Gas, the Morrison Engine, and the Morrison Chair.*

Respectfully, C. BURNSIDE STODDARD.

MESSRS. JOHNSTON BROS. 28 *East* 13*th St., New York, July* 24*th*, 1873.

GENTLEMEN: In reply to your request for the opinion I have of the Morrison Chair, after a few weeks' use, I can say, first of all, that it is the easiest Chair to work over I have ever used; and not only for the operator, but also for the patient. The adjustment of the parts, after a little familiarity, is most rapidly accomplished to suit almost any whim of either doctor or patient. There is a facility in bringing yourself and your patient into harmonious working relations, which can be understood only in its use. It is not necessary to speak in detail of its parts, which are familiar to all—only of the foot-rest, which seems most intractable of all, I have found perfectly convenient for all classes of patients. Wishing you success commensurate with your merits,

I am very truly yours, W. A. BRONSON, M. D.

MESSRS. JOHNSTON BROS. *Norwalk, Connecticut, July 24th,* 1873.

DEAR SIRS: In reply to your note of yesterday I would state that one thousand dollars would be no inducement for me to part with the Morrison Chair if I could not replace it. My patients are unaminous in their praises of the Chair, and all wish that they had one at home. I know of no greater praise or recommendation than that, that could be bestowed on any chair.

Yours in haste, THEO. E. SWIFT.

MESSRS. JOHNSTON BROS. *Lee, Mass., July 26th,* 1873.

DEAR SIRS: I am using the Morrison Chair, and find that it meets every requirement for comfort to myself and patients. It gives me pleasure to say that I consider it a perfect Chair. It has been regarded with uniform admiration by all who have examined it.

Very truly yours, H. H. FITCH.

MESSRS. JOHNSTON BROS. *Hartford, July 25th,* 1873.

DEAR SIRS: The "Morrison Chair" I consider the best, most convenient, and in all respects the easiest to adjust for dental operations, of any I ever used.

Yours truly, JOHN CODY.

MESSRS. JOHNSTON BROS. *Wooster, Ohio, April 24th,* 1874.

GENTS: I received your Chair, and am *well* pleased. Have used it for one month and cannot find an imperfection in it. So far as my experience has led me, there is not a requirement of an Operating Chair that it does not possess. I would not exchange it for any chair now manufactured.

Yours with respect, C. B. MOWER.

REMODELED
Morrison Dental Engine.

NEW YORK, May 25, 1874.

JOHNSTON BROTHERS.

GENTLEMEN:—You ask my opinion of the Remodeled Engine:

I have now used mine two weeks, and would say that its advantages to the operator over the old style are nearly as obvious as were those of the first Engine over hand work. JOHN T. METCALF.

The cut on the following page well illustrates the new Engine, and, with the subjoined description, will make the alterations plain to all.

DESCRIPTION.

1st. The rocking movement of the upright standard is abandoned, and a rigid, handsomely plated, and tapering column substituted.

2d. From the top of this column extends an arm directly in front of the patient. This arm swivels upon the column, and is adjustable vertically, being secured by a brace at any height desired, thus bringing its end directly in front of the patient's mouth, whatever be the height of the operating chair.

3d. Attached to the end of the adjustable arm by a most ingenious universal joint, is a shaft about twelve inches long (corresponding to the extension arm of the old engine), which carries at its end the handpiece.

- *a.* This shaft, being short, is much lighter than the old one, enabling the operator more perfectly to feel his work, and is also less liable to tremor.
- *b.* Both sides of the mouth may be reached without changing the position of the engine.
- *c.* By lowering or raising the adjustable arm, according as the operation is upon the superior or inferior teeth, the driving spring is but slightly flexed, and great steadiness secured.

4th. The off-centre spring is attached above the driving wheel, partially supporting it and reducing the friction.

5th. The handpiece is much smaller, and the burs so secured that they may revolve in either direction, and at the same time be used either with a pushing or pulling cut, and this without the use of a catch spring. Old style burs can be refitted to this handpiece.

The model engine of this pattern, as above described, has been for several weeks in use in the hands of one of the best operators in our city, and is pronounced by him a very decided improvement.

JOHNSTON BROS.

REMODELED MORRISON ENGINE.

Price, $60. Right Angle Attachment, $5. Boxing, $2.

JOHNSTON BROTHERS,

Dental Depot,

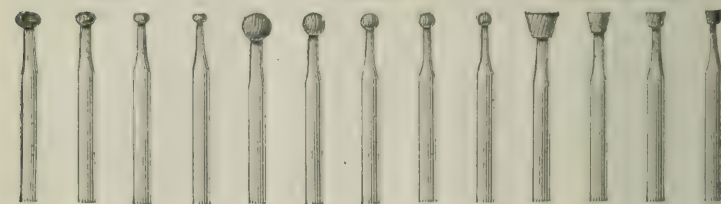
812 BROADWAY, NEW YORK.

Equipment for Morrison's Dental Engine.

PLUG FINISHING BURS.

1

OVAL. ROUND. INVERTED CONE.



2 3 4 5 6 7 8 9 10 11 12 13 14

BUD SHAPED. BARREL SHAPED. PEAR SHAPED.

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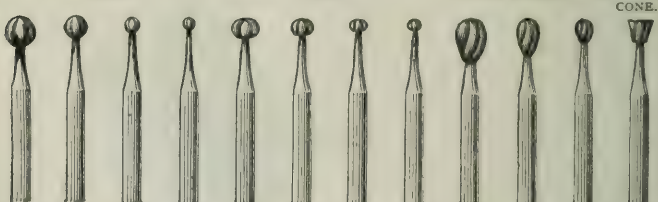
BURNISHERS.

ROUND. OVAL. PEAR SHAPED. INVERTED CONE.



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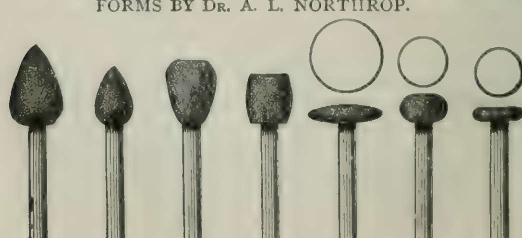
CORUNDUM POINTS FOR MORRISON ENGINE.

FORMS BY DR. A. L. NORTHROP.



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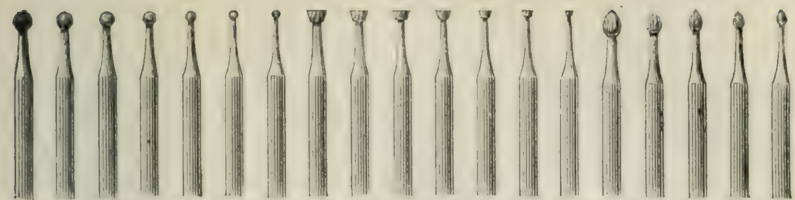
CAVITY INSTRUMENTS.

ROUND. INVERTED CONE. BUD SHAPED.



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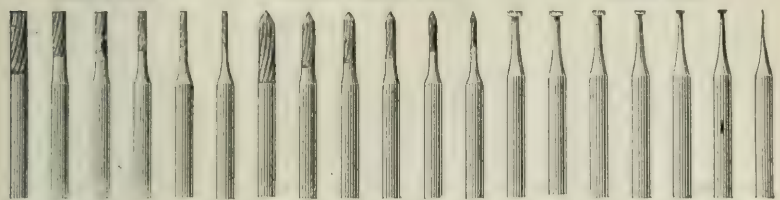
FISSURE BURS. POINTED FISSURE BURS. WHEEL BURS.



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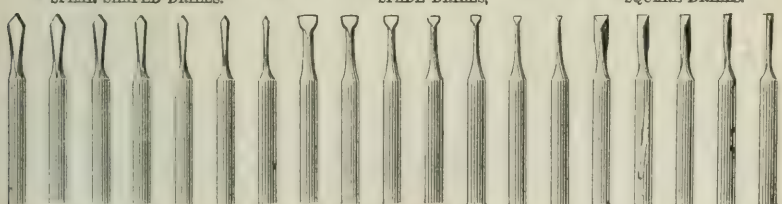
SPEAR SHAPED DRILLS. SPADE DRILLS, SQUARE DRILLS.



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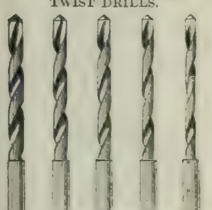
TWIST DRILLS.



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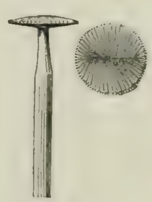


Price, $1.25.

CAVITY INSTRUMENTS FOR RIGHT ANGLE ATTACHMENT.

We have in stock, and can furnish *Cavity Instruments* for the *Right Angle Attachment*, of all styles and sizes, from Nos. 100 to 218, inclusive.

SCOTCH STONES, MOUNTED.

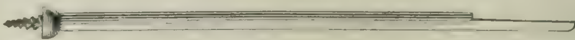
The Scotch Stones enable the operator to give a finish to fillings hitherto unattainable, and only need a trial to be appreciated. We have these in stock of forms Nos. 75, 77, 80 and round. Other kinds of stones are now in process of manufacture.

HINDOOSTAN STONES, MOUNTED.

Forms of Nos. 75, 77, 80, and round. Of each shape we make three sizes. The cuts referred to by the numbers represent the large size. These are, beyond doubt, of the greatest utility in cutting either gold or bone. They last longer than any other stone.

LEATHERS, MOUNTED.

We have in stock Leather Points mounted on Mandrils, of forms Nos. 75, 77, 80 and round, designed to be charged with powders, for polishing and finishing fillings.



Screw Mandril, to be armed with leather, wood, etc., for polishing fillings, cleaning teeth, finishing plates, etc.

PRICES.

Finishing Burs,	Per dozen,	$6 00
Stoned Finishing Burs,	Each.	1 00
Cavity Instruments and Screw Mandril,	Per dozen,	3 00
Stoned Cavity Burs,	Each.	50
Right Angle Cavity Instruments,	Per dozen,	3 00
Leathers, Mounted,	"	3 00
Hindoostan Stones, Mounted,	"	6 00
Scotch Stones, Mounted,	"	3 60
Burnishers,	"	9 00
"	Each,	0 75
Corundum Points, Mounted,	Per dozen,	1 50
" " not Mounted,	"	0 75
Bands for Engine,	"	1 50
Twist Drills	Each,	40

IN ORDERING INSTRUMENTS, DESIGNATE THEM BY THEIR NUMBERS, AND STATE WHETHER THEY ARE WANTED TO FIT THE OLD STYLE (A), NEW STYLE (B), OR REMODELED (C) HAND PIECE.

A. Old Style Hand Piece.

B. New Style Hand Piece

C. Remodeled Hand Piece

☞ Our instruments are all made of the best Stubs' steel. We shall spare no effort to make them equal in every respect to anything offered to the profession.

☞ We are constantly adding new forms and sizes of Plug Finishing Burs, Cavity Instruments, Drills, etc.

DIRECTIONS FOR USING THE ENGINE.

1. In lifting the engine, be sure *not to bend* the arm which carries the hand piece.

2. Whenever the least noise is heard, oil the engine with the best sperm oil. The rapidity of motion renders oil a necessity.

3. The only part at all likely to break, is the small spring, which conveys power at the upper end of the hand piece. It is not soldered to the shaft, but is slipped on by hand. To put on a new spring, take hold of it near the end opposite that you apply to the shaft, and twist as if to *uncoil* the spring, at the same time pushing the spring on to the shaft. You will be greatly aided in removing the broken parts, by twisting, as if to uncoil, the spring. A piece of emory paper will be found convenient to aid in holding the polished shaft.

4. The engine, to run satisfactorily, should be oiled daily ; and the driving-spring should be perfectly straight.

IMPROVED INSTRUMENTS.

We have added to our list three new and very popular sizes of Cavity Burs. One round called 106½, one inverted cone called 113½, one wheel-shaped called 137½. Each is smaller than any before made by us, of its shape. These numbers are neatly put up in dozen and half dozen packages, and are completely protected from oxidation and from rubbing against each other in transportation.

They are very popular, and we frequently receive orders from dentists for from one to three dozen of each.

STONED BURS FOR BURRING ENGINES.—For some time past, we have made to order, a Bur for use in Burring Engines, by the following process: The teeth of the Bur being laid out with extreme accuracy, are filed to *exactly the same length*, but are not brought to a cutting edge. The Bur is now tempered, and each tooth *afterwards stoned to a fine edge*. This secures a Bur perfect in all its cutting edges, and unequaled by anything hitherto offered in the market. Of these we are provided with a limited supply, of both Cavity and Finishing Burs, excepting Fissure *Burs*. (See Price List.)

Thin Boxwood Discs for carrying Polishing Powder, to polish fillings in proximal cavities. These are of four sizes, from ⅜ inch to 1 inch diameter.

We add that the Instrument-stand, elsewhere illustrated, will be found very useful for the convenient keeping of the Engine Instruments while not in actual use.

Besides the form represented in the cut, we have them with smaller holes, and very many more of them, so that each Bur may be kept by itself.

We invite the fullest examination of our Engine Instruments, as regards

The quality of the steel from which they are made.

The shape and finish of the cutting edge.

Their temper.

The rapidity with which they cut.

Their durability.

The shaft of each instrument is *round and highly finished*, and can therefore be used without unreasonable and unnecessary injury to the nose of the hand-piece, which injury occasions unsteadiness in all the uses of the Engine.

They will *bear* examination in *quality* and *price*.

JOHNSTON BROS.

INSTRUMENT STAND FOR ENGINE BURS.

Price, $2.50.

No. 1 as above. No. 2 with many more, but smaller holes.

This is made of rosewood and maple in alternate layers, and is very ornamental. Besides the form shown above, we have another like this in all respects except that the holes into which the burs are placed are made so small as to hold only one or two instruments in each. We call this No. 2.

JOHNSTON BROS.

CARVACROL. C.^{20} H.^{14} O.^{2}

HIGHLY RECOMMENDED.

PROPERTIES:—Locally applied, Carvacrol, in full strength or diluted, seems to possess antiseptic, disinfectant, sedative, mildly caustic and escharotic, gently styptic, stimulant, irritant and rubefacient properties.

Carvacrol, as a substitute for Glycerole of Thymol and Creosote or Carbolic Acid, in cases of Odontalgia, Sensitive Dentine, Alveolar Abscess, "Canker Patches," etc., may be locally employed in the same manner.

As a gargle for Tonsillitis and inflamed mucous membranes, it may be employed in the proportion of about three drops to the ounce of water, or the strength can be increased when more powerful action is required.

Price per Bottle, $1.00.

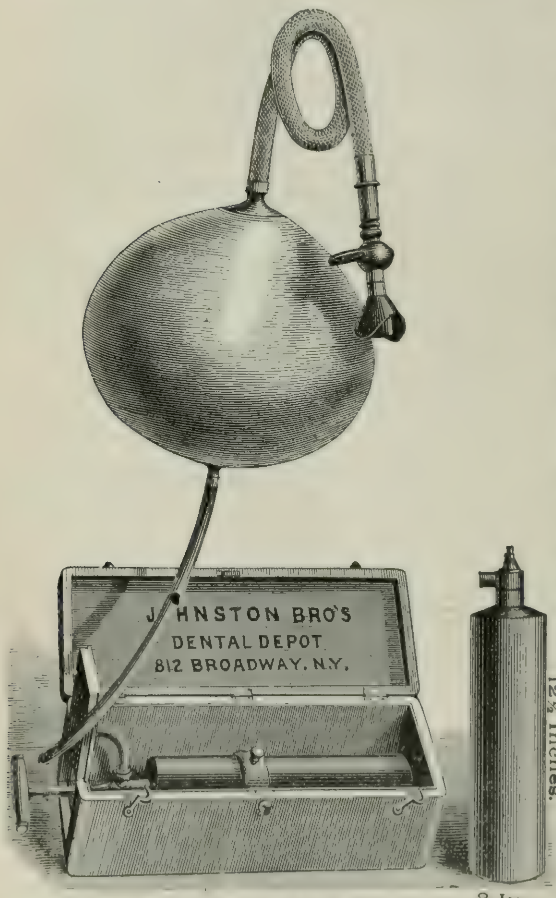
H. L. SAGE, D.D.S.

For Sale by JOHNSTON BROS.

LIQUID NITROUS OXIDE.

[Revised Circular.]

The increased and still increasing demand for Pure Liquid Nitrous Oxide, and for information concerning apparatus for its exhibition, renders it necessary that we issue yet another edition of our circular upon that subject As the Surgeon's Case, as first introduced, has proved itself in every way all that we could wish it to be for the place assigned to it, we cannot do better than to repeat here our first description of it.



SURGEON'S CASE.

This comprises a strong cylinder containing One Hundred Gallons of Gas; a strong morocco covered case, provided with an iron ring and set screw, by which the iron cylinder is held in place during use, and its delicate valve protected from injury; also, a rubber bag with rubber tube at one end for admission of gas, while an inhaling tube, handsomely covered on its outside, and provided against any possibility of a collapse by a tin-coated spiral of wire on its inside, is fastened at its opposite end—an inhaler—a nickel-plated wrench and a nickel-plated key. In fact, *all* the apparatus necessary for administering the gas. The whole case and contents weighs about fifteen pounds. This is here shown as open, and the bag which receives the gas from the cylinder, and from which it is exhibited to the patient, is represented as filled, and suspended above the case. The cylinder is also shown as standing at the side of the case. This is the simplest and most popular form of apparatus, and will be everywhere welcomed—because of its portability for use outside of the operating room.

REVISED PRICES.

Complete Apparatus — Surgeon's Case, with Metallic Inhaler. . . . . **No. 1.**	$42 00
Complete Apparatus—Surgeon's Case, with extra sized Bag and Metallic Inhaler. . . . . **No. 2.**	45 00

Boxing either, $1.00.

Each complete apparatus includes a 100 gallon cylinder, filled with Liquid Nitrous Oxide.

Cylinder with 100 gallons of Gas.	16 00
Refilling Cylinder.	6 00
Morocco covered case, with ring and thumb screw, velvet lined,	12 00
Polished bl'k walnut " " " " "	13 00

Of these latter we have only a limited number.

Rubber Bag, with covered inhaler tubing, (about 4 gall. capacity)	5 00
Rubber Bag, with covered inhaler tubing, extra size.	7 00
Inhaler, with spring valves, trumpet mouth-piece, with Plated connection.	8 50
Inhaler, latest style, with two way stop cock, adapted to the use of both dentists and surgeons, with connection.	9 50
Key, Nickel Plated.	1 50
Wrench, "	50
Union, Nickel Plated, (nut and tube), for connecting cylinder and gas bag.	1 50
Covered Inhaler Tubing, per foot.	50
Plated Connection to fit old style Inhaler.	1 00

REMARKS.

When the side of a bag has been perforated, it cannot be repaired, but should be replaced. Send on the tubing by mail, and the bag will be replaced. Price. 3 00

As this cannot be done *properly* except by the use of rubber cement, and by persons experienced in the business, we think it every way advisable that it be entrusted to the rubber workers, and not attempted by the dentist.

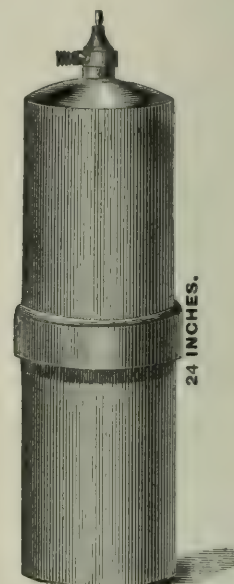
JOHNSTON BROS.,

812 BROADWAY, N. Y.

ONE THOUSAND (1000) GALLONS GAS.

LIQUID NITROUS OXIDE.

1000 GALLON CYLINDER CASE.
Price, $30.00. Boxing, $2.00.



1000 GALLON
CYLINDER.
Price, $36.00.
Boxing, $1.50.

Gas in 1000 gallon lots, 4½ cents per gallon.

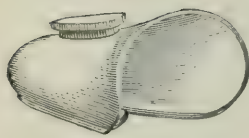
The above illustrated apparatus is especially desirable where large quantities of nitrous oxide are used, or where it must be sent a great distance. In this form it is best to ship it by *fast freight*—which makes the cost of transportation very light.

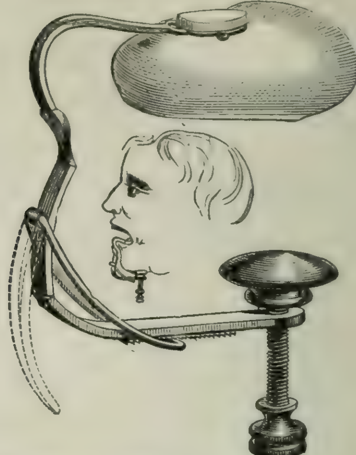
THE GAS CAN BE KEPT FOR ANY LENGTH OF TIME,

AND IS

CONSTANTLY ON HAND AND ALWAYS OF THE BEST QUALITY.

OSBORN'S TONGUE HOLDER.





Osborn's Tongue Holder and Duct Compressor. Is Cleanly, and Reflects Light in the Mouth.

This is by far the best Tongue Holder and Duct Compressor ever offered to the profession. The cut exhibits one adjusted as when in the mouth, also a view of one in use.

It possesses the following advantages, in addition to those of other apparatus designed for the same purpose.

1st. It covers the tongue, and so completely protects it from accident, while at the same time permitting to the patient some chance for changing its position *inside of the cup.*

2d. The cup which covers the tongue being of the finest white porcelain, *reflects light in the mouth*, and so *greatly* aids the operator.

3d. The cups can be readily and perfectly washed, and the use of the apparatus is therefore far less objectionable to the patient than is that of the ordinary metallic tongue holder.

4th. This apparatus is so readily applied that it is often used when the application of rubber dam would be difficult, or require considerable time. The cup pressing upon a pledget of spunk or bibulous paper nicely placed upon the ducts effectually prevents the flow of saliva.

It is recommended by Drs. William H. Allen, W. C., Bennett, and Frank Abbott, of New York city, and C. Fones, of Bridgeport, Conn.

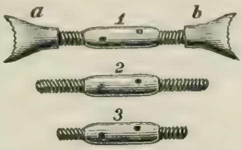
PRICES.

Complete, with three porcelain cups	$10 00
Sets of three cups	4 00
Single cups	1 50

JOHNSTON BROTHERS.

JACK SCREWS.

Devised by Dr. C. S. LONGSTREET, with Dr. A. McCOLLOM'S Improved Head.



This device is greatly prized by those who have used it.

PRICES.

Full Set, as above, Nickel Plated, screw and two extra bars ..	$2 50
Jack Screw, Nickel Plated..................................	1 50
Bars, " " each..............................	50

JOHNSTON BROTHERS.

FLOSS SILK.

That recently made for us is unsurpassed in purity, in fineness of fiber and in uniformity. Each spool contains twelve yards.

Price per spool..	$ .15
Price per dozen..	1 50

A liberal discount to Dental Depots and Druggists.

JOHNSTON BROTHERS.

TOOTH POWDER.

A good saponaceous article.

Price in bulk, per pound..................................	$1 00
Five pound lots	4 00

JOHNSTON BROTHERS.

ROYCE TOOTH POWDER. (Excellent.)

Per pound...	$ .75
Five pound lots...	2 50

JOHNSTON BROTHERS.

STYPTIC COTTON.

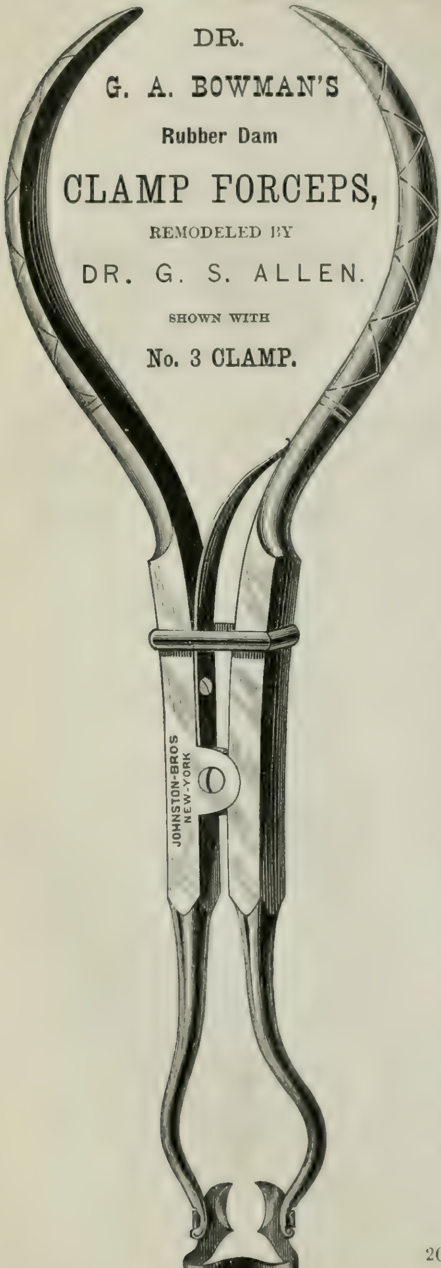
A most excellent article to staunch the flow of blood.

Per box...	$ .30

JOHNSTON BROTHERS.

RUBBER DAM CLAMP FORCEPS.

Of these we offer two styles, both deservedly popular.



POINTS OF DR. T. C. ROYCE'S

Rubber Dam Clamp Forceps,

Shown with Clamp. Handles are exactly like the other style, (Bowman's.)

Both styles of these Forceps have points accurately adapted to the shape of the clamp at the neck, and hence will be found much more convenient than those hitherto offered the profession in this point of adaptation. (See also advertisement of Clamps.)

If so ordered we can supply either style of Forcep with a band, which will keep the Forcep and Clamp extended and ready for use when the hand of the operator is removed, as shown on the Bowman Forcep.

PRICES.

Forcep, either style	$3.00
" " " Nickel Plated	3.50
Complete set of Clamps, embracing eight forms	4.00
Complete set of Clamps, embracing eight forms, plated	4.80
Clamps, each	50
" " plated	60

JOHNSTON BROS.

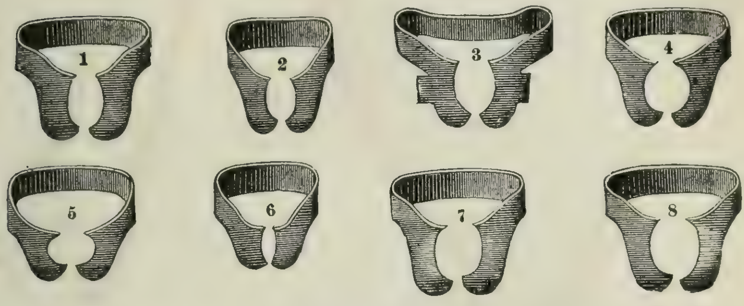
We were never more sure of doing signal service to the Dental Profession than now in offering the

IMPROVED

Rubber Dam Clamps,

INVENTION OF

DR. DELOS PALMER, OF NEW YORK.



Price, set of Eight,	Oil finish,	$4.00.	Each plain,	50 Cents.
	Nickel plated,	4.80.	" Nickeled,	60

For use with Rubber Dam Clamp Forceps.

These Clamps are designed to be placed on the tooth at the commencement of the operation. Afterwards apply the Rubber Dam by passing it over both tooth and clamp.

DESCRIPTION.

Nos. 1 and 2.—Universal Clamp for Molars.

No. 3.—For posterior cavities in molars standing alone.

No. 4.—For third molars, or any molar of a cone shape. This Clamp can oftentimes be turned around while on the tooth, so as to place the bow of the Clamp out of the way of the operator.

No. 5.—For biscuspeds.

No. 6.—For lateral and central incisors.

Nos. 7 and 8.—Rights and Lefts.—For cavities under the gum, on the buccal or lingual surface of molars.

Cuts of two favorite styles of Rubber Dam Clamp Forceps will be found on another page.

These Clamps have prominent points of marked superiority over those of other manufacturers.

First. Each has been carefully adapted to the shape of the tooth for which it is designed, *under the personal supervision of Dr. Delos Palmer*, the inventor.

Second. A groove is made by us in the clamp, into which the forcep nicely fits, so that the clamps firmly hold their position on the forceps, when once adjusted, instead of tilting from one position to another—as is the case when no groove is provided.

JOHNSTON BROS.

NEW YORK COLLEGE OF DENTISTRY,

EIGHTH ANNUAL SESSION,

1873-74.

FACULTY.

WM. H. ALLEN, Emeritus Professor of the Institutes of Dentistry.

FANEUIL D. WEISSE, M.D., Professor of Regional Anatomy and General Pathology.

FRANK ABBOTT, M.D., Professor of Operative Dentistry and Oral Surgery.

ALEX. W. STEIN, M.D., Professor of Histology, Visceral Anatomy, and Physiology.

F. LE ROY SATTERLEE, M.D., Professor of Chemistry, Materia Medica, and Therapeutics.

C. A. MARVIN, D.D.S., Professor of Mechanical Dentistry.

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A. RUST CUYLER, D.D.S., Demonstrator of Mechanical Dentistry.

C. F. W. BODECKER, D.D.S., Assistant to the Professor of Chemistry, etc.

Students may matriculate at any time, as the Infirmary is open, for regular students of the College to practice in, the entire year.

The regular course of Lectures will commence middle of October, 1874, and continue until the 1st of March. Three hours of each day of the week (except Saturday) will be devoted to lectures, and four hours to *Clinics,* and practice at the Chair, and in the Laboratory, under the direction of the Demonstrators.

The Infirmary consists of two large rooms, each seventy-five feet in length, with an excellent light to operate by, furnished with operating chairs and tables, all arranged to the best advantage for the more perfect instruction of students. Patients are usually in attendance in great numbers.

Tickets for one year's Instruction, including Course of Lectures, Matriculation, Demonstrators', Diploma Fees, and Practice in the Infirmary the seven and one-half months between the sessions....	**$150.00**
For the Course of Lectures only.......	**100.00**
Matriculation (paid but once)	**5.00**
Diploma Fees.......	**30.00**

Board may be obtained for from $4 to $8 per week.

For further information, address

FRANK ABBOTT, M.D., Dean,

78 West Twelfth Street, New York.

JOHNSTONS'

Dental Miscellany.

Vol. I.——*JULY, 1874.*——No. 7.

THE MOST EFFICACIOUS FORM OF ARSENIC FOR DEVITALIZING DENTAL PULPS.

By Thomas Burgh, D.D.S.

All who have used arsenic for this purpose, and who seek to thoroughly extirpate the pulp, have probably found some difficulty in uniformly procuring the utmost effect of which the material is capable. Either the common arsenic, if kept dry, and mixed at the time of using, is too coarse to be dissolved by the creosote or other fluid which is used as a vehicle, or it is too crude ; or, if it operate well at first, it speedily deteriorates, and soon becomes worthless. There is a good article of arsenic ready prepared with creosote, sold at the dental depots, which works well at first, but which soon loses its quality, and a careful operator will throw the bottle away before a quarter of it is used. It is anything but satisfactory, after making an application of an arsenical preparation, to find that it is unreliable, or that it is deteriorating ; that it works effectively in this or that case, but that it can never be depended upon ; to find the pulp almost as much alive as it was before the application ; that you cannot even open into it, or, if you can, you cannot extirpate any distance. If any man should tell me that he never had any such trouble, I should suspect that he was not in the habit of thoroughly extirpating the pulp, that he devitalized just enough to stop toothache, or to obtund the sensibility to the extent which would enable him to fill the tooth without any immediate periosteal irritation. And by thorough extirpation I do not mean the impracticably exact, unnecessary, and even undesirable following of every narrow and tortuous canal ; but I should suspect that he does not even extirpate to the extent which is readily practicable with fine extirpators

and broaches, and which is absolutely indispensable for the assurance of success.

It is not sufficient that we have an arsenical preparation which operates satisfactorily at first, or for a while, but which will not retain its properties for any length of time. To say nothing of the expense, or even of the inconvenience of frequent renewals, deterioration must have a period of inception and of gradual increase ; and it is unsatisfactory not to know when it has begun, and never to be able to tell when we can command the full power of the material. What we want, is a preparation which will not deteriorate, which will stand on the case a decade, if need be, and out of which the last particle will be as good as the first. Then we shall have something which can be depended upon, and we shall be subjected to no other uncertainties in its use, except those which spring from the constitutional idiosyncracies of the patient.

I have tried all the different methods of using and combining arsenic, when I thought I would again resort to the dry article, and mix as I used it. In purchasing arsenic from the druggists I have always taken what they gave me, not understanding that there was any difference in the quality. This time, the druggist to whom I applied asked me if I wanted the best. Surprised, I answered of course I did ; when he gave me some of Squibb's. This preparation is finely ground, white, and almost an impalpable powder. It is a confession of ignorance, or inattentiveness perhaps, but I was unaware of the existence of such an article ; and it may contribute to the satisfaction of my fellow practitioners to make them acquainted with it. It is the most efficacious and reliable material I have ever used. I keep it dry, and catch a little of it, about half or quarter the size of a medium sized pin's-head, upon a bit of cotton saturated with creosote, on the point of an excavator, at the time of using. I have had the article on hand now for over a year, and I find it works just as well as when I first used it. I do not mean to say that it will destroy the pulp from crown to apex at one application. I should be suspicious of any preparation that was endowed with the strength, or was used in quantity, to do so. But it will devitalize the pulp to an extent and with a uniformity which I have never before been able to secure. I can invariably, after allowing the minute portion which I have described to remain not over twenty-four hours, open up the pulp, and remove a large portion of it, and sometimes I am enabled to remove the whole and fill at that sitting ; while with other preparations which had been on hand as long as this, I could do little or nothing.

With these the nerve might be sufficiently destroyed that it would not ache; but for all purposes of operating it would be as alive as ever. If I used larger quantities I might succeed in destroying the nerve thoroughly at one application, but I should fear that, from a quantity sufficient to destroy the nerve in so short a time, a surplus would be absorbed by the dentine and the highly vascular cementum, and attack the periosteum in course of time. I prefer the safer method, even though it take longer. I seldom or never make a second application, applying creosote and tannic acid to prevent the decomposition of any portion of the pulp, which, upon filling, I may be unable to remove, and allow the remains of the pulp to slough, which takes about a week. If it is a tooth which shows, I employ but little tanin, as I fear it may add to the discoloration which usually ensues after devitalization, but if it is a back tooth, I use freely, as I find more satisfactory results attending its use than without it. Some operators allow the nerve to slough without attempting to open into it, after removing the application of arsenic; but I am urged to remove all I can, both of dead pulp, decomposed dentine, and of solid bone, by the consideration that the application of arsenic has been absorbed by these parts, and if allowed to remain there a week or so, might do serious injury to the tooth or alveolus. After it has done its first work on the pulp, I want to get rid of it and scrupulously clean and syringe out all that the arsenic has come in contact with, and that I wish to get rid of, until I strike a sensitive part of the nerve. Arsenic is a valuable dental agent in its place, but in bungling or reckless hands great mischief may be done with it; and if the quantity which I have sometimes seen used were allowed to remain in the tooth a week, or even the remains of it after the first application had been removed, without thorough cleansing, enough could be absorbed to destroy the vitality of a whole jaw. The human economy will stand a great deal of abuse, but that it is not safe to impose upon its powers, the terrible accidents which have been known to attend the inconsiderate use of arsenic attest. It is often the case that in making an application to an irritated nerve, the nerve is so exceedingly sensitive that it is impracticable to remove a mass of decayed dentine which may cover it. When the wax is removed, and the cotton on which the arsenic was applied, no arsenic is visible, although the wax, or other retaining substance, may have been so tight as to preclude the possibility of its all escaping around it. The arsenic may be found, some of it in the dentinal structure, some of it in the pulp, some of it may have escaped around the wax, but most of it is in this spongy mass of decay, awaiting

only the presence of moisture and the lapse of time, to penetrate the tooth, or to insensibly assail the periosteum around the margins of the gum, if the cavity is near it. Before the tooth is allowed to stand for the nerve to slough, this mass of decay should be swept away, if nothing more is done, and the arsenic with it. Speaking generally, that cannot be regarded as any other than negligent practice where this is neglected. By this careful method I seldom have any trouble attending the destruction of pulps, and I regard my nerve cases as among the most satisfactory results of my practice. Occasionally I find a little periosteal inflammation and suppuration, but the trouble is slight and transient, and is generally confined to those whose system is depressed by their excesses or other debilitating causes. The mouths of my patients are generally as healthy around a devitalized tooth as around those whose pulps are intact. No unsightly, offensive and troublesome abscesses exist, such as so often proclaim the incompetence or unfaithfulness of the operator ; nor am I mortified by the terrible immediate periosteal inflammation which I have seen attend inconsiderate tampering with the pulp and pulp canal ; but clean and healthy gums and alveoli reward a tolerable amount of patience and fidelity, or exemplify the extent to which these virtues may compensate an indifferent ability.

Whilst upon this subject, I would allude to the conviction which has generally obtained, that the necessity of employing arsenious acid for the purpose under consideration has not yet been destroyed by any method of capping by which it has been hoped to save nerves alive. It is due to my friend Dr. Atkinson to say, however, that the employment of oxychloride of zinc, which, as far as I am aware, he was the first to recommend for this purpose, has in my hands come nearer to that object than any other substance I have ever used. I have been surprised and gratified at the results obtained in the mouths of young persons, though for adults it is utterly unreliable.

ON "AN UNEXPECTED PROPERTY OF ADHESIVE GOLD."

Messrs. Johnston Brothers :—After reading the article in the April number of your Miscellany, by Thos. Fletcher, Esq., F.C.S., on the above subject, I was not surprised at the conclusions arrived at. I had had for a long time an idea that the adhesive gold fillings would not hold water or preserve a tooth as well as soft gold foil or tin foil. It seemed to me quite a natural and philosophical principle that to wedge

gold in a tooth would preserve it water-tight better than to build from a retaining point, and depend on driving every particle of gold separately against the walls of the cavity. Well, though, as I say, I felt almost sure that this was true, I thought I would, as Thos. Fletcher, Esq., did, demonstrate the fact, so that I could *show*, if necessary, the proofs of this statement. I therefore made the following experiment:

Taking the small round ivory handle of a broken mouth-mirror, I drilled an irregular cavity in the end, and after filling it, sawed off the end, leaving a very pretty little cylinder of ivory with a gold filling in one end. I drilled another cavity, filled and cut off as before. This I did five times, making the following record.

No. I. Cavity filled with soft, unannealed cylinders, using two No. A 3, and four No. A 1 cylinders.

Time occupied in introducing the gold, not quite five minutes; force, hand pressure.

No. II. Cavity filled with adhesive gold foil, No. 5, rolled into rope, and cut off in convenient pellets. Finished with No. 60 foil in single layer; hand pressure. Time, seventeen and a half minutes.

No. III. Cavity filled with a sponge gold made in Vienna; hand pressure. Time, eight minutes.

No. IV. Cavity filled with Fletcher's Gold, and Platinum alloy amalgam.

No. V. Cavity filled with tin foil. Time, four minutes.

After waiting a week for the amalgam to contract, expand, or change as it pleased, I dropped the little ivory cylinders into a glass of colored water, and left them twelve hours, removed them, and laid them in the sun to dry. After this I sawed carefully through each cylinder and filling, and examined closely for a *leak*. The outside of the ivory and fillings were thoroughly stained.

What was my surprise at finding *not the least sign of a leak* in any cavity, excepting the one filled with tin foil. This was a very small leak at one side, and proved to me that the foil was too heavy for the pressure applied. Every one of the gold fillings and the amalgam was perfect, and none of the cavities were regular, as I had left angles in all of them. Will some other, or a number of gentlemen, experiment, and let us know the results? The subject is an important one.

I honestly acknowledge that I was surprised at the results of my experiment, as, after the statements so startlingly and forcibly made, I felt almost sure of finding the soft gold foil, and the tin foil fillings, and *perhaps* the amalgam, water-tight. I did not smile the "superior

smile," for I did not think the sponge gold nor the old-fashioned adhesive pellets *would* make water-tight fillings.

I worked rapidly, as you can see by the *time* I've given above, and especially with the sponge gold; for with this I tore off a large piece that nearly filled the cavity after condensation, and simply *rammed* it into the cavity.

Let us have some more experiments, honest and true, and in a multitude of testimony truth may come out.

C. M. Wright, D.D.S.,
Ex-Professor of Mechanical Dentistry in Ohio Dental College.

Basel, Suisse, April 28th, 1874.

NEW YORK ODONTOLOGICAL SOCIETY.

May 22d, 1874.

The minutes of the last meeting were read and approved.

The President asked if any gentleman present had any incidents of office practice to offer.

Dr. C. E. Francis described an operation in repairing a broken superior bicuspid, where the buckle cusp was broken off. He procured a plain plate eye tooth, such as is used on gold plates, and fitted it very nicely to the root, and then took a thin platinum band and riveted the tooth fast. Then bent it around the inner cusp and soldered it. After having fitted it, he slipped it over and filled it with Fletcher's amalgam. It was an experiment, but it proved very successful, and the lady was pleased with it.

Dr. Kingsley exhibited an ingenious appliance which he had constructed for the restoration of a facial deformity. The case was one of hereditary syphilis in a girl seventeen years of age, where the roof of the mouth, all the alveolar processes anterior to the second permanent molar on each side; the anterior portion of the maxilla; vomer; turbinated bones and a portion of the nasal bones had been destroyed. The manner of taking the impression was described at the last meeting of the society. The Prothesis for restoration was made of a thin shell of hard, black vulcanite, being very light and very strong, and was adapted to all the surface of the enlarged nasal cavity, leaving a passage through it for respiration. The roof of the mouth was restored and teeth added in the usual form, and the nose, which had sunk down to nearly a level with the cheeks, was supported by a movable prop hung upon a hinge and operated by a spring, so as to exert constant forward and upward pres-

sure upon the sunken organ. This movable nasal support was so constructed as to fall back entirely within the body of the instrument, and thus permit its introduction, and the pressure was created by a most ingenious application of elastic rubber ligatures. The extent or power of the pressure could be controlled *ad libitum* by the simple act of tightening or relaxing the ligature. The patient was wearing it with satisfaction, and the nose was improving in form as the result.

Dr. Kingsley, being the regular essayist of the evening, introduced his subject by reading an editorial from the Dental *Cosmos* for September, 1872, and cordially endorsed the sentiments therein contained.

Then followed a paper upon

"THE ESTHETICS OF DENTISTRY."

Theoretically, Dentistry is a science and an art. Practically, to a very great extent, it is empiricism in place of science, and bungling mechanism in place of art; nevertheless, it has established its claims to be a science through its investigations, and through its organized system of practice; but as an art capable of taking rank as one of the fine arts it seldom finds an advocate, and still more seldom a practitioner. The dental surgeon assumes a position of superiority, and flippantly consigns the whole department to the workshop, where the only idea of art comprehends ordinary mechanics.

As a consequence, Artistic Dentistry has never risen, except in rare individual cases, to anything above Mechanical Dentistry, and the very term by which the department is known is often used as one of reproach. In every assemblage, public or private, on the street, in the drawing-room, or wherever we may turn, we see displayed the disgraceful productions of these dental mechanics. It becomes a serious question whether the art of Dentistry, aside from some methods in operating on the natural teeth, has, with all the inventions and improvements of the last decade, made any advance. The operative department has assumed to be the department, *par excellence* and *per se*, and we see the results in the education of a new professional generation, who ignore any knowledge of Prosthetic Dentistry as unworthy their exalted talents; not realizing that a mastery of all its elements will do more to educate and qualify them for perfection, even in the one department, than any other course that could be pursued.

It can be demonstrated beyond a peradventure that these ignored and despised branches of dental practice are capable of the highest idealization, taking rank with sculpture and other branches of fine art; ca-

pable of appealing (though in a more limited manner) to the same sentiments and emotions, and requiring for their expression the identical talent and same imagination which characterize the sister arts.

With the ancient Greeks, all works which exhibited skill were called works of art, and to the present day the term art, in its broad signification, is applied to every skillful physical or intellectual performance. In this sense, music, poetry, painting, sculpture, architecture, dancing, oratory, medicine and surgery are equally arts.

In this broad sense every operation in Dentistry is an art. But as the arts have multiplied, terms of distinction have become necessary; as fine arts and mechanic arts, with all their subdivisions.

All that ministers to the esthetic sense, furnishing food for the imagination, belongs to the fine arts; all that contributes to the physical comfort, and the utilitarian progress of mankind, we class as mechanic art.

The mechanic arts may demand consummate skill for their execution; they may require for their development rare inventive faculties, and their combinations of mechanical principles and powers may be truly wonderful, but their individual works require but little effort of the brain in their reproduction. Education in skillful manual labor, without the capacity to originate a single new idea, is all that is required. The laws which govern their reproduction are those of mathematics, and to be able to copy a given form with exactness is the sum of the talent required. They may be directly of more practical value to mankind, but they make no appeal to the finer emotions of our being. In all that excites the imagination, that calls into action the affections or leads the mind away from the contemplation of the material and sensual, they are dumb.

The ideal arts, on the contrary, furnish this gratification, and wheresoever art falls short of this requirement it can make no higher claims than that of mechanism. For illustration: It is easy to conceive, in this day of cunning workmanship, that it would be possible to make out of cast iron an artificial denture—teeth, gums and base of the same metal, which would fulfill perfectly all the utilitarian requirements of such an appliance.

It might be accurately fitted to the jaw, and admirably articulated with the antagonizing teeth. For comfort in wearing, and for power of mastication, it would be all that was desired, and yet it would not have one element of dental art in its construction. It would be purely a mechanical performance, and come under the head of dental mechanics.

In that common and every-day operation in dental practice, called "taking the bite"—particularly when there is an entire upper and under denture to be supplied—there is required, for its highest success, a talent far greater than that exercised by the sculptor upon the same limited locality.

Aside from the inherent good taste, or appreciation of the beautiful, on the part of the operator, there must be some knowledge of physiognomy, of facial expression, of the harmonious relations of one feature with another, and of symmetrical proportions; besides the sound judgment to decide upon the best method for the sake of utility.

All the details in making an artificial denture, such as taking an impression, making plaster casts, making dies, swaging plates and fitting them to the gums, are all purely mechanical processes. All these may be perfectly carried out by one who has no appreciation whatever of the beautiful, of harmonious proportions, colors or sounds; but in the one process of taking the bite—no matter whether the plate or base is gold, silver, platina or gutta percha—none but a true artist can go through its various stages successfully.

Dental practice, by an inherent law and by common consent, is divided, in the main, into two departments: one, commonly termed the "Operative," or "Surgical," which is made to include all efforts for the preservation of the natural teeth, and all surgical operations in the buccal cavity; the other, called "Mechanical," (but in place of which I much prefer "Prosthetic," as more appropriate,) includes the making of all appliances for the correction of deformities of the buccal cavity, but principally the making and inserting of artificial teeth.

In the practice of Surgical Dentistry, as has been before intimated, there has grown up an unwarrantable assumption that all that was refined and cultivated, all that was worthy the exercise of our noblest faculties in the pursuit of our profession, was to be found in this department, and that mere mechanics, wholly unqualified by education in science and art, were deemed capable of practicing the other.

The only performance of Surgical Dentistry which requires a talent and skill equal to the mechanical arts, is the introduction of fillings into the cavities of decay, and this skill is mere manual dexterity, guided by good judgment; its highest achievements at the present day are in the so-called contour fillings made of gold, in which an attempt is made to restore the form of a tooth injured by accident or decay.

Every tooth has an individual character and expression, not only in

harmony with every other in the same mouth, but by the same divine law, when in a normal condition, in harmony with the features and character of the creature, be he animal or man.

These physical characteristics are so marked and prominent that the merest novice has no difficulty, as a rule, in locating any human tooth that has been removed from its fellows ; and yet, of the attempts at restoration of any large portion of the crowns of teeth by dentists, there are few that bear any very close resemblance to the original form of the lost part.

If a cast were taken of these restorations, and examined separately, how few would identify them as being any portion of any tooth. The cusps, the depressions, the sutures, the easy and graceful outlines, and all that marks the individual teeth, are wanting.

With the same portion of a natural tooth, even duplicated in another material, as a perfect copy in plaster, there would be no hesitation in identifying its locality with a tolerable certainty ; but a cast taken of many a restoration would not be suspected of its original application.

The skill, therefore, exercised in every operation on the natural teeth is purely mechanical, and in esthetic culture bears no comparison with its associated department. No performance of the dentist can make any pretension to be a fine art, *separate and distinct from all others ;* but as a subdivision or specialty of one of the arts, Dentistry is entitled to a consideration which it has never received.

Prosthetic Dentistry, as an art, is a department of sculpture. *Form* in individual members, *form* in grouping and arrangement, and *form* as a medium of expression, are equally the distinguishing characteristics of both Sculpture and Dentistry.

Every effort of the brain in the production of a statue is spent upon the clay model. It is this which the artist studies, and as he knows that every variation of the form changes the expression, and that expression is a key to the character, so does he bend with all earnestness to every detail, building up here and depressing there ; swelling out this muscle and relaxing that, until in satisfaction his work is consummated.

This model in clay is the end of the artist's labor ; the mechanic now takes it out of his hands, and every succeeding operation, until it appears the finished marble, is only one of mechanism. In like manner the conception and execution of a properly devised artificial denture admits of the work of the artist and of the mechanic with the line as distinctly drawn.

In the construction of an artificial denture everything that relates to

its appearance belongs to art, everything that affects its utility is controlled by mechanism. It is not only possible, therefore, but very common to see artificial teeth that are worn with great comfort, and may be as serviceable as any that can be made, and not a single element of true art has entered into their construction. The adaptation to the jaws, and the articulation for masticating purposes, in these days of plastic materials, involves no skill beyond that possessed by many a mechanic, but the form and color of the teeth selected, their arrangement with each other, and the adaptation of the whole to the demands of the unimpaired features, present an appearance which is a grim satire upon Dentistry as an art.

Reference has already been made to the knowledge, skill, and natural taste required in "taking the bite." This process is in fact the very first step in making an artificial denture, which calls for esthetic culture.

Its mechanical details are very simple, but its possible artistic results are wonderful.

With the trial plates, of whatever material, adapted to the gums, a very simple method is to take some small blocks of any soft wood, say a half inch in length and width by less than that in thickness, and secure them to the trial plate in the locality of the bicuspids. It will be found more convenient to place the side of the wood, and not the end, in contact with the plate, as it will be easier so split off shavings or chips when placed in this way, and thus reduce on trial any unnecessary height. For sticking these blocks, a preparation of common resin two parts, and beeswax one part, will be serviceable. One block will be required for each side of the upper plate, and also one for each side of the lower, and the blocks of each plate must be so placed as to antagonize with the blocks of the opposite plate when all are in the mouth.

The plates may be then adjusted and some estimate made of the probable required length, or rather height. These will be likely to be too long, but can be readily reduced as before indicated ; when the result is approximately reached, a rim of soft wax may be formed on each plate. Common beeswax, or wax with some paraffine added, will be easily manipulated. The plates must be re-adjusted to the mouth, and the patient directed to close the jaws until the blocks come in contact, after which in the mouth and out of the mouth, as is most convenient, the external form of the wax will be so manipulated as to produce upon the external features the desired contour and expression. The author attributes so much importance to these mechanical details, and

in his own practice intends to be so very precise in the results, that he rarely requires another sitting from the patient for the purpose of "trying in the teeth," before they are completed. Even for the greatest utility of the piece, without any reference to its artistic appearance, all the time and care should be here given that is required to insure absolute precision of length and fullness, and these steps can be so carefully conducted, that on the final adjustment of the completed dentures, not the slightest alteration in the articulating surfaces will be necessary. But in an artistic view this sitting of the patient is the all-important one; for, as before stated, the wax must be worked up to the exact contour of the completed denture. It will not do to leave it to the guess work of an assistant, or to the half-forgotten memories of a hurried observation. The artistic effects must be produced in the wax and retained in the duplicating denture, and this cannot be done at lightning-speed.

It requires calmness, deliberation, and repeated trials of the wax forms. The author has in many instances spent a half day over one patient at this important sitting, and been rewarded with an ultimate result that not only gratified himself, but the patient and the friends.

During this process but little aid can be obtained from the patient, by an anxious co-operation or by any suggestions. It is far better that the patient remain in ignorance of the importance of this sitting. The attempted and well-meant efforts of the patient generally end in failure to the operator, and if this co-operation is discovered it is better to adroitly lead the mind away to the contemplation of some other subject.

Patients under these circumstances have a most perverse way of doing just what neither they nor the operator desire. Therefore it is that a result which shall determine final precision can only come in the mind of the operator from repeated adjustments and with some movements of the mouth and cheeks to show muscular action and expression. Before the dismissal of the patient, the centre of the lips, and also the line of their parting, should be marked on the wax, and in the final arrangement of the teeth, it is preferable, as a general rule, that the cutting edge of the superior central incisors correspond with the line of the separation of the lips when in repose. This will always insure the exposure of the teeth when the mouth is in action, without presenting them unduly. After the bite is completed, the immediate subsequent steps can be conducted by a skilled mechanician, and will vary somewhat with different individuals, but the instruction in that branch of mechanics is already so ample in various text-books, that it is unnecessary to follow it. We will rather turn back and again consider the same process, but solely from the esthetic aspect.

In the patient before us we find a countenance deformed by the entire loss of the teeth, superior and inferior; alveolar processes more or less absorbed, wasted and unsupported muscles, sunken cheeks and lips, and a nose whose cartilaginous portion has lost its hereditary character.

With the wax and props between the jaws as before described, the first step will be to decide upon the profile. This is not only primary in the order of the work, but it is of primary importance. It is the central point around which all the modeling revolves and becomes the standard which governs all the other features.

The profile well chosen, all the other features will be made to harmonize with it, and according to the profile, will correspond in form the beauty of all the other features.

No face was ever repulsive where the profile was beautiful, and no face can be made beautiful where the profile is ugly.

This outline can be determined better by having some standard of beauty in the mind as an ideal toward which we are working.

This idea of a standard, or typal face, is not a mere whim of the fancy, which allows each individual to select, construct, or adopt, such an one as his refined or perverted taste might choose, but it is one which belongs to a perfectly balanced intellectual and physical head,—one which, in its elements and characteristics, is not uncommon in nature at the present day, and one which existed and has been accepted as such from the earliest historic times.

The construction of this ideal head or face is reduced to a system and governed by a canon, which has remained with but little variations from time to time for a period of over 4000 years.

On the monuments of Egypt there is such a canon recorded in stone, which gives the proportions of the entire human system externally, as then accepted. From that day to the present, there have been proposed probably a hundred systems. Nearly every artist of renown, from Polycletus, Michael Angelo, and Leonardo Da Vinci, down to our contemporaries, Page and Story, has suggested slight variations. But through all this criticism of the whole figure, the proportions of the individual features of the face and head have remained substantially unchanged.

The following system for drawing the profile head is taken from Wiegall's "Art of Figure Drawing."

"First draw a vertical line, equal in length to the height of the intended head; and then draw two straight lines at right angles to it, at its extremities; these two horizontal lines will touch the top of the head and the lowest point of the chin respectively. Divide the vertical line into four equal portions. See Figs. 1 and 2.

The *first* of which marks the vertical distance between the top of the head, and the front roots of the hair ;

The *second*, that from the hair to the root of the nose, (between the eyes) ;

The *third*, the length from thence to the bottom of the nose ;

The *fourth*, that from the bottom of the nose to the bottom of the chin.

Bisect this *fourth* portion ; and the point of bisection determines the lower point of the under lip.

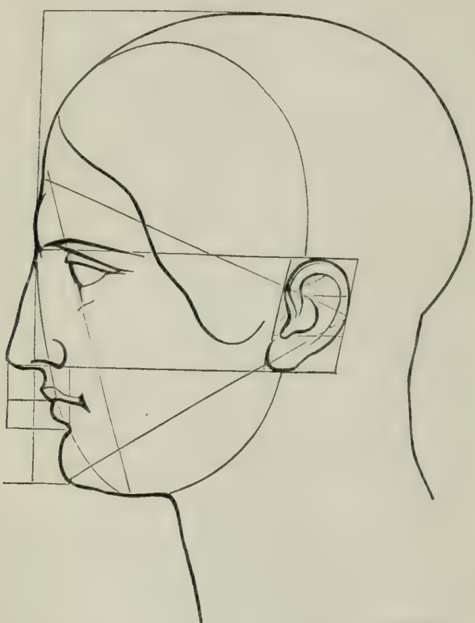

Fig. 1.

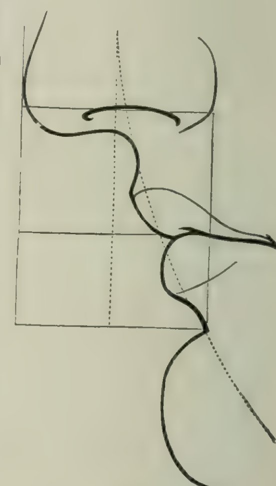

Fig. 2.

Again, divide this last part (*i. e*, from the nose to the front of the under lip) into three portions :

The lowest portion determines the thickness of the under lip ;

The next above determines the thickness of the upper lip ;

The uppermost, which is rather longer than the middle one, determines the distance between the nose and the upper lip.

These points being determined on the vertical line, next draw between the horizontal lines, but touching only the lower one, an oval, the larger diameter of which being vertical, is to be equal to the length of

the vertical line from its top to the point marking the opening of the mouth or the top of the upper lip, and its lesser diameter equal to three-fourths of the larger, and let it be placed so that the extremity of its lesser diameter may touch the vertical line a little above the point marked for the roots of the nose. If this oval be carefully drawn, in its course it will pass somewhat behind the front opening of the mouth and the middle of the upper lip, and through the commencement of the chin under the lip; it will determine the angle of the under jaw (not its course); and it will pass through the centre of the ear.

From the point on the vertical line opposite the upper lip, draw a straight line perpendicular to the vertical, and meeting the oval; the bisection of this straight line will give the commencement of the upper lip.

The projection of the nose before the vertical is nearly equal to the distance from the bottom of the nose (where it intersects the vertical), to the opening of the mouth.

The vertical dividing the nose equally, the width of the wing of the nose is equal to its projection in front of the nostril."

(*To be continued.*)

PRIZE ESSAYS.

BROOKLYN, JUNE 15th, 1874.

PUBLISHERS JOHNSTONS' DENTAL MISCELLANY.

GENTLEMEN: You were pleased to appoint the undersigned a committee to decide upon the relative merits of the essays on "Burring Engines and their Uses," submitted in competition for the prize you offered. We beg leave to report that after a careful consideration of the essays offered—eighteen in number—we are unanimously of opinion that the best one is that bearing the signature of "Levator," although there are several of nearly equal merit.

ALBERT H. BROCKWAY,
WM. JARVIE, JR.,
C. P. CRANDELL.

812 BROADWAY, NEW YORK, JUNE 18th, 1874.

A. H. BROCKWAY, D.D.S., PRESIDENT ESSAY COMMITTEE.

DEAR SIR: Enclosed please find the unopened envelope which accompanied the essay signed "Levator."

Please open it and send us the name of the writer of the essay.

Respectfully yours, JOHNSTON BROS.

BROOKLYN, NEW YORK, JUNE 18th, 1874.

JOHNSTON BROTHERS, 812 BROADWAY, NEW YORK.

GENTLEMEN: Yours of to-day is received. On opening the envelope referred to, I find "Levator," and E. G. Wheeler, of Mobile, Alabama, to be one and the same person, and take pleasure in congratulating the Doctor on his success.

ALBERT H. BROCKWAY.

The foregoing correspondence needs no explanation to those who have read our offers for prize essays. The committee have given much time and careful consideration to the essays submitted to them for examination, and they assure us that there are several articles among those examined by them which will benefit the profession, and do great credit to the writers. These, as well as several of the prize essays on "Rubber Dam and its Uses," will be published as soon as time and the space at our command will admit.

We take great pleasure in shipping a Morrison Chair to Doctor E. G. Wheeler, who, unmindful of what fate had in store for him, had just written us for one. We hope that the good doctor will make use of some of the strength and time which its use will save to him, in making further contributions for the pleasure and instruction of our readers.

JOHNSTON BROS.

BURRING ENGINES.

A PRIZE ESSAY,

By DR. E. G. WHEELER, of Mobile, Alabama.

It is evident that there are periods of repose and then of activity in the development of our mental and physical natures, when it seems as if a sudden leap placed us upon a new and higher plane than before. Something analogous to this we observe in the advance of science and art. After a period of quiescence, longer or shorter in duration, we are startled by some grand discovery or useful invention, which revolutionizes our former ideas and fills us with pleasure and astonishment. But if we carefully analyze these sudden developments, we shall discover that the state of repose was such only in appearance, and not in reality. It was rather a time of active preparation, of the gathering of materials, of the concentration of forces, which culminated in a disruption of former boundaries, and in a sure advance to a new and higher position. Dentistry is not an exception to this law of progress. On the contrary, it affords beautiful and striking illustrations of it.

But we can stop to specify but one, and that one among the last, and to my mind by far the greatest of those beneficent contrivances which have appeared from time to time to bless mankind.

To speak thus of the Dental Engine or Burring Machine may appear to some extravagant, and savoring of hyperbole.

Were the writer many years younger, he might consent to be called *enthusiast*, but not now, for the scattering gray hairs admonish him that it is the time of life when his words should be those of soberness, seasoned with wisdom, and free from the visionary fancies of youth. In proof, then, of the sober truth of what has above been stated, I propose first to speak of what the Dental Engine is, and then of its uses, leaving it to the candid judgment of the reader, to decide whether I have over-estimated its value or have failed to make out a claim of pre-eminence for it.

In its present perfected state, it is an ingenious and beautiful piece of mechanism, by which power applied by the foot or by galvanic action is transmitted by means of a band and connecting rod (as in the Morrison), or by connecting wires (as in the Electric), communicating through a hand piece with the bur or drill, which is the objective point of the whole contrivance.

In speaking of it as a beautiful instrument, I have but little reference to its polished and gilded exterior, but refer to the beauty of design, the elegance of adaptation, which renders it almost as flexible as a rubber band, without the continuity of power being broken or even impaired. While this is true, yet it is so perfectly under control, that within a moment's time it may advance from the slowest, and, indeed, almost imperceptible movement, to its greatest speed (amounting to its thousands of revolutions in a minute,) and back again through all the gradations to perfect rest, with scarcely an effort of the operator. And then again it is *always ready*. For more than twelve months the Engine has been my "right-hand man," and during the time has not been unfit for service for a single minute. No breaking or slipping, no indications of weakness or imperfection, but *now* works as smoothly and perfectly as it did the day when it first mirrored back my happy face. But we are not yet done, for its noiseless action deserves especial notice. There is no humming, jarring, or clanking machinery, to alarm or excite the nerves of the most sensitive patient, but it goes to its work so silently, and executes it with such marvelous rapidity, that it rivals nature's perfect mechanism.

But I must pause a moment at this point to remark that this descrip-

tion holds strictly true only in relation to the "Morrison," which is that employed in my operations, and which fully satisfies my wants, although I am not unacquainted with the claims and merits of others that are highly recommended. To institute an inquiry into the relative merits of each would require too much space, and be foreign to my design. I prefer, therefore, to take them as a class, waiving minor differences, and avoiding invidious comparisons, believing that each possesses sufficient merit to entitle it to respect, and the lasting gratitude of the possessor.

I will now proceed to mention some of their varied and important uses.

No doubt the desire to provide some new expeditious means of excavating cavities first called it into existence. From this inceptive point radiated lines of inquiry, and with the inquiry came modifications and improvements, adapting it to purposes at first not even imagined, until now, it has become the operator's constant companion, and used in almost all the details of operative and mechanical dentistry. But these generalizations are not sufficient. They do not amount to a demonstration.

Let us, then, be more specific, beginning with the process of cleansing and polishing the natural teeth. For removing that peculiar species of discoloration, analogous to a vegetable growth, so often seen on children's teeth, this instrument is peculiarly adapted. When an acid is used for this purpose, several minute grooves or fossæ are often discovered, within which the roots of this production vegetate, and which also serve as depositories of acrid matter. Thoroughly to cleanse and at the same time reduce all irregularities, and leave, instead, a smooth and polished surface, is the province of the Dental Engine, armed successively with corundum, Scotch stone, and leather buff. If it were useful for nothing else, to accomplish this heretofore very annoying and difficult task should bring it into general acceptance.

We may now advance to the next special use, viz.: in separating teeth. Here we find, as before, that it is almost invaluable, particularly when extensive separations of molar teeth are required.

This has always been one of my professional horrors. But with a mandrel, mounted with one of Arthur's disks, and a drop vial to prevent undue heat, this fearful operation is brought within the limits of Christian endurance. Its efficiency in separating all the anterior teeth is so obvious as to need no special mention, and with this great advantage over the file or chisel, viz.: that the frail margins of cavities can be

ground away to the exact amount required, without any danger of chipping or breaking. It reaches places most inaccessible by other means, and in all cases leaves the ground surfaces in a comparatively regular and polished condition. Again, when it is desirable to space and fill approximal cavities from the lingual aspect, the operation is not only rendered possible, but simple and easy, leaving the labial or buccal portion entirely intact when required.

But we hasten on to what was, perhaps, the original design of the Engine, viz.: the preparation of cavities. For this purpose, variously shaped burs and drills are prepared in assorted sizes for every class of cavities.

With wonderful ease and rapidity they cut away the rugged edges, or projecting masses of enamel or bone—expose the hidden labyrinths of decay—follow crevices and fissures to their utmost limit, and, in a word, thoroughly prepare a complex cavity, and in so brief a time, and with so little fatigue, that it is indeed a wonderful triumph of human ingenuity. With this instrument those accidents can never occur in which a chisel or excavator has been thrust by an unguarded hand into the soft parts adjacent to the tooth, or into an exposed pulp, for the hand-piece can be grasped so firmly and guided so accurately, that its range of execution can be limited to a hair's breadth. With its aid we can manipulate with the tenderest hand, approach the most sensitive point, reach the most inaccessible position, and thus confirm its completeness and general usefulness.

But perhaps no part of its work is so satisfactorily done as the shaping and polishing of fillings.

By using fine cut burs and forms of corundrum and Scotch stones given by Dr. A. L. Northrop, all surplus material constituting the filling is cut away, perfect antagonism secured, angles rounded off, and surfaces smoothed and burnished, making them not only comfortable to the patient, but beautiful in appearance, looking like so many jewels set in their ivory caskets. To secure such results has been the ambition of dentists in every age. But the time and labor required has always been a serious obstacle, except to those who possessed an invincible energy. Now, there can be no excuse, for the Engine brings it within the power of every local operator to properly finish and beautify his work.

We shall next notice its use in pivoting teeth. In this operation it can be made to do nearly the whole task.

First, the tooth is cut off with one of Arthur's disks, shaped by

Northrop's corundums, nerve canal enlarged by a fissure bur, and all so promptly as to reduce the labor to its minimum. And after the artificial crown is in position, should it be discovered that a corner needs rounding, or a new shape given it, for the sake of appearance or comfort, this little instrument enables us to apply the remedy at once, without detaching the crown from the fang—a consummation which has long been devoutly wished for.

In mechanical dentistry it is also very useful ; almost every plate which passes through my office shows its handiwork. Armed with a coarse fissure bur, it trims away the surplus vulcanite more expeditiously than file or scraper, and in every case of repair, it cuts out the fissure, excavates pits and grooves, roughens the surface, and prepares for the mechanical attachment of the new and old material. In the case of gold plates with teeth attached with vulcanite or celluloid, which we regard as the "*summum bonum*" of mechanical work, it pierces the plate for the insertion of metallic pins or loops in a very brief time, and indeed almost every day furnishes some new evidence of its general usefulness.

But lest we consume our time and space, let us hasten to notice its great mission, that which I regard as its crowning glory. It is *not* so much to relieve the wearied arm or over-strained muscle—it is not to afford leisure and recreation to the operator, as it is to excite ambition to excel, by rendering possible, and, in fact, comparatively easy, many operations which before were almost impracticable to the majority of practitioners. Its mission, then, is to assist in placing the profession on a higher level, and to imbue the dentist with the conscious ability of being equal to any emergency which may present itself.

It stimulates to more careful execution, and cultivates habits of exactness, which cannot but advance the operator to greater conquests.

It is a labor-saving machine only from the fact that, with the same amount of labor, the results are far better, and approach nearer the standard of highest excellence.

Forming my conclusions from experience, as well as from my observation of its effects upon others, I have no doubt that many a dentist will date a new period of advancement from the day he purchased a dental engine, because it furnished him the means of gratifying an honorable ambition to excel ; and finally, because he was encouraged by the grateful praises and commendations of those who were so unfortunate as to require his services.

DENTAL ETHICS.

THE INTELLECTUAL FUNCTIONS AND RESPONSIBILITIES OF THE DENTAL PROFESSION.

The following valedictory address was delivered before the Second District Dental Society of S. N. Y., in Brooklyn, April 13th, 1874, by W. S. Elliott, D.D.S., of Goshen:

Gentlemen: During the year which closes to-night, it has been my duty as well as my privilege, through your kind preferences, to preside over the deliberations of this Society; and as my term of office now expires I take to myself new pleasure in being able to pass the *gavel* to one whom I so highly esteem both personally and professionally—and who is so capable of acting the part which you have assigned him.

I desire to take this occasion to present you my congratulations in view of the continued prosperity of our organization. During the past twelve months it has been animated with a vitality made healthful through the pabulum of personal friendship, professional liberality, and intellectual effort; and the presence of so many here to-night gives further evidence of a desire to foster those characteristics which are ever tending to a still fuller recognition of the claims of our chosen profession.

The past has been favored by the earnestness of the few who have devoted their time and talents to the advancement of Dentistry by propagating the underlying principles upon which are based true methods of practice; the future is endowed with the experience of those earnest workers, and glorious are the visions of that temple which shall be raised through the efforts of our profession as a welcome asylum for suffering humanity. I can see to-night, rising above the parapets, the shining pinnacles of individual renown, and may *we*, ere we part, resolve to adorn that structure with the emblems of progress wrought by an earnest and conscientious devotion to our calling.

In contemplating the significance of our profession we are struck with the peculiar relationship it sustains with regard to other branches of knowledge. It has risen, Phœnix like, from the ashes of prejudice and ignorance, and is lifted almost above itself in its aspirations to a broader and fuller claim; for no science, however occult, no art, however divine, no religion, however Christ-like, but finds here a claimant that shall appropriate to itself largely the body and spirit of all the evolutions in its own development.

We welcome the light that is opening to us the depths of the unknown, and we stand utterly amazed at the revelations of those truths as they are successively presented to our senses. Whatever be our theories in relation to natural phenomena, we are constantly obliged to take new grounds, ignoring or correcting to-day what was the happy conviction of yesterday ; and to-morrow we may be moving on to a recognition of new and still more startling facts.

Shall we rest in the assurance that we are to-day wiser than those of a former period ? Be this as it may, the title page of the volume is scarcely read, and the laden folios are as yet unperused ; and the age, though accepting the results of modern physical research, yet refuses to acknowledge these as an ultimatum. There is, indeed, the unknowable and the incomprehensible, but these are merely relative rather than absolute terms, and the domain of the unknowable and the incomprehensible certainly recedes before our efforts to investigate, and we are thereby invited onward to further discoveries and still higher conquests.

In the progress of thought every department of science and philosophy is opening vast fields to the research of the earnest explorer. Abstractions are giving place to the realities of positive knowledge, and these will command all the powers of the intellect to grasp and utilize. Nor must we be blind to these revelations. Progress is our motto, and to appropriate is our duty ; thus we are led to realize the relativity, correlation and unity of all knowledge.

In the geologic record we trace the world's history engraved on the very rocks themselves, and as translated by the student of nature the writing is as intelligible as that of your own hand. Herein we are told of long ages elapsed ; of the cycles of time when strata upon strata have been deposited ; of the antiquity of man, and of successive epochs since his creation. This knowledge is not necessarily foreign to our purposes, since by its aid we are enabled, through the light which geology casts upon biology, and even upon the hypothetical problems of protoplasm and the evolution of tissues, to trace the genesis of our art and of its requisites, as well as to judge of unusual phenemona as it is presented to us in actual practice.

In astronomy we may learn of other worlds yet more exalted in glory than this which is assigned to us. The mystic bands of the spectrum reveal to us their elements ; and we are herein taught the chemistry of the sunbeam, the laws of light, and to recognize in all of nature's phenomena the power of this all-pervading sun-presence. Shall we undervalue, then, the precepts that come to us through these understandings,

or acknowledge these departments of science as important helps in our chosen profession ?

In the discussions pertaining to our specialty it becomes evident to my mind that our thoughts are occupied too little with the underlying principles which actuate the processes of our daily practice. We are disposed to ignore the fundamental truths and spend our time in debating the differences which result from ignorance or a careless apprehension of those features which shculd guide us in establishing a correct method of procedure. We are too easily satisfied with prospecting the surface and gathering the well-worn pebbles that have already surfeited the senses and have been many times tossed away. May we not toil to unearth the treasures of knowledge that lie deeper ? for we render ourselves guilty of a pretentious acquisition when we assume to adjust our practice to the laws which control our being and our destiny. Shall we escape this charge ? We flatter ourselves that we are truly advancing in the recognition of those truths. If so, let it be evinced in our meetings by a closer reference to the essentials, and a corresponding reprieve from those minor things with which we are all familiar.

He is more or less empirical, who, upon the basis of his mere shrewdness and tact, would deign to institute a diagnosis and treatment in any given affection. Though success may attend his efforts to alleviate and to restore, this is but partial, for he recognizes no principle of action, and his judgment is no guide to a rational system of dental practice. I would, then, that subjects of a more vital interest would engage our attention.

What are the forces and influences which pervert the normal function of life ? What are the essential features of this perversion, and what is the result ?

Physiology unfolds to us the law of our being and growth, but how vast is the consideration ! Shall we venture to approach it ? Though it is not given to us to know wherein is all of Life, we are endowed with that degree of perception that will make us to see in part, and thereby learn to live according to the laws of that higher Intelligence which fashions and upholds.

This science embraces so much that is connected with the functions of inorganic matter that we must be conversant with the laws that control such matter and take cognizance of the relationship which exists between physical and vital phenomena.

The affections of matter and the affections of mind are correlated, and by studying the one we are led more thoroughly to appreciate the

other. The forces that pervade the various objects of our sense are the same that control the living organism, and we name them after the same order ; heat, light, electricity, magnetism and chemical affinity.

Everted circumstance becomes the plea for predominance, but in normal animal life we find a balancing of those forces—a satisfaction of each equivalent, which results in the function of growth or repair. This is Physiology—the minute features of which should become the study of every one who would understand what is Life.

Pathological phenomena exhibit themselves in the unbalanced condition of those forces, where is evidenced an imperfect elaboration of the elements of growth and a disintegration of those products once perfected. Let us understand, then, that the processes that are evolved in a healthy organism give a status to these several forces which is more or less definitely designated.

The human body exhibits a temperature of about 98° Fahrenheit, which degree is but slightly departed from, even under extraordinary exposure to heat and cold. At this elevation it is held as a static power so long as it is balanced by the influence of the other forces. Light lends its aid to a degree in the evolution of this force, and is also resolved into each correlation. Chemical affinity, electricity, and magnetism are the forces which determine the "career of the elements," having the power to elect and subordinate in accordance with laws now largely discovered and demonstrably modifiable by science and art. To discern these laws of our environment, to obey them and finally to modify them to the adaptation of human wants and human progress, is our peculiar province, and when the abstract and the concrete, the practical and theoretical, are so intimately connected and so inseparably dependent upon each other as they are in dental science, we have a right to claim and to expect a wonderful development for the future.

The doctrine of the correlation and conservation of forces sheds new light upon our pathway, for now have we learned to associate physical with vital phenomena—inorganic with organic elements.

This comes directly home to us, and as we realize these facts we are reminded that a broad culture in physical science is demanded, that we may be able to expound, in an intelligible manner, the principles of our specialty. In whatsoever department we concentrate our aims, it becomes but the focus of the converging rays that pervade the wide domain of human intelligence.

In the *arts* as well as the sciences we should be specially cultivated.

The esthetic features of our calling are imperative in their claims. A due appreciation of the beautiful becomes a necessary qualification for the true dentist, for his aspirations are none less than the preservation to the "human face divine," of those expressional features which stamp it as with a "seal of Heaven."

An intimate association with artists and their works tends to that refinement which will exert its influence in all our labors; it will round the angularities of life's daily toil, and tone down the glaring tints of character, soften the hard features of indifference and selfishness, and smooth the rough surface of uncongeniality.

Music, painting, sculpture, and architecture should find special admirers in our profession, that at the instance of each of these branches we may impart to our own efforts that qualification which is most assuredly demanded, namely, the function and faculty of giving to the science and labors that employ and embody our professional efforts, those ministrations of art which shall spiritualize as with an esthetic halo the results of our own endeavors as applied in practice. Thus we escape the low grovelings of those who, without professional enthusiasm, and equally destitute of professional qualifications, have seized upon the practice of our art as a mere method whereby they can become less dentists than money-hunters and money-worshipers; for it is only by devotion to our calling, prompted by professional enthusiasm, that we are enabled to place the status of our profession immeasurably beyond the range of pretentious charlatanism and trickery.

Encouraged, then, in these advancing claims, shall we prove ourselves the merited recipients of this effulgence of learning? Our own work is as limitless as this is, and we cannot and should not rest satisfied until there remains no longer to be solved the problems of biology, mechanics, art, or science; or even the suffering humanity that claims our daily care shall no longer seek the aid of the hand of skill and sympathy, guided by the richest results of human learning and research.

Impressed with these convictions, I commit myself to a united sentiment, in favor of our colleges of dentistry. Earnest as they are to raise the standard of acquirement, and competent as they are to teach the principles upon which are based correct methods of practice, they should receive your unbiased consideration and support. Assist your students in attaining to, and inculcate in them a desire for professional honors, and coming time will bless you for your effort, and laud the spirit manifested in your desires and sacrifices.

RUBBER DAM.

By "Nomus."

The progress of Dentistry in America during the past fifty years has certainly been remarkable.

Then, it was but an adjunct of the barber's art, and consisisted simply in giving relief from pain by the extraction of the offending tooth. To-day, it stands forth as an acknowledged and honored profession, having for its object the conservation of the dental organs, and the restoration of those already impaired, to their former state of efficiency and usefulness. To bring about this wonderful advancement, science has been called upon to shed some of her brightest light, and art's cunning hand has been impressed to assist in the great work.

Since its first step forward from its former ignoble condition, science and art have never been dissociated, although the parts they have separately played have varied from time to time.

First, art seemed to hold the more prominent place, and the dentist's skill was principally required to frame and perfect a substitute to supply the place of the dental organs which had all along been so extensively sacrificed.

After that, science advanced to the front, and although many teeth had previously been saved by filling, she now demanded that many more be saved, since *man's art* could never equal the handiwork of God.

To do this, the inventive mind of the dentist was more especially directed toward the discovery or development of the best means of saving many classes of diseased and impaired teeth that were formerly sacrificed. From that time to this, the art of filling teeth has made truly wonderful advancement.

Among the various improvements that have been made in connection with the filling of teeth up to the present time—and they have indeed been many and valuable—none in our estimation can compare with the "Rubber Dam," invented and introduced to the profession ten years ago by Dr. S. C. Barnum, of New York.

Valuable improvements had all along been made in the forms of instruments, in the manufacture of gold-foil and other materials for filling, in the manner of preparing and shaping the cavity for the reception of the filling, together with others having for their object the keeping dry of the cavity, but as yet no means had been devised that would assuredly and perfectly protect the tooth from saliva and moisture during the process of filling.

This was felt and acknowledged for many years to be the great want of the profession, but no one seemed able to supply it until Doctor Barnum's bright mind conceived the idea, and he gave it to the profession in an essay read before the Brooklyn Dental Association, Dec. 14th, 1864.

As a discovery of real value, its merit was acknowledged at once by some of the leaders in the profession, but, like all other truly valuable discoveries, its value was not then recognized by the masses.

Gradually, from that day to this, it has been growing in favor, until to-day it stands universally acknowledged as the greatest and most valuable adjunct of operative dentistry.

Before its invention, there were some operators in the country who were so skillful in battling with the saliva, that they were able to produce operations than which the world perhaps has never seen better, but their number was small; whereas to-day, ten years after its introduction, the good operators of the country can be numbered by hundreds and perhaps thousands, and are to be found in almost every village in the land.

If, then, through this simple invention, the good operators of the country have so wondrously increased, (and who will dare say that their increase was not primarily due to it?) how great a benefactor have we in him who gave it to us, and what a proud and just satisfaction must it be to him who lives to see the dental profession, and indeed all mankind, so deeply indebted to him.

The great value of the invention to the dentist consists primarily in absolutely protecting the tooth operated on from moisture, either of the saliva, or of the breath, by placing around it this coffer-dam of rubber, and for this purpose its value can hardly be over-estimated.

With it properly placed and secured, the operator can feel sure of being able to keep the tooth dry any length of time, and then, with the gold kept free from the slightest shadow of moisture, and the cavity dry, he can, in his own time, place a filling that will be as good as his individual skill can make it. He will not be hurried so as perhaps to slight his work, as formerly, through fear that the saliva may reach it before it is completed. The great mental strain, caused by the uncertainty of being able to keep the filling dry throughout the length of the operation, and which was as wearing upon the system of the operator as the labor of filling, is entirely done away with.

Before the introduction of the rubber dam, in mouths where there was a very abundant flow of saliva, and the operations to be performed

either large or difficult, in numberless cases, fillings of inferior material were introduced instead of gold, because they could be inserted in a much shorter time, and thus kept dry.

Since its introduction, however, the necessity for such inferior work is almost entirely avoided, and in its place we now see on every hand large and difficult operations of gold taking the place of a poorer class of work, thus securing the teeth filled to the possessor for a far greater term of usefulness. Thus, this invention not only adds to the length of the dentist's life, but gives to the patient the benefit of better work, and elevates the profession in the eyes of all, by showing to the world a much larger percentage of first-class and beautiful operations than formerly.

Were this all that the rubber dam had done for us, it would alone be sufficient to stamp its invention as one of the greatest within the last quarter of a century ; but it possesses other advantages scarcely less important than the one just described.

The introduction of a compact mass of gold into a cavity from which all caries has been removed, is not alone sufficient to insure that tooth from future decay. Very frequently, after a tooth has thus been prepared for filling, as we think perfectly, if the rubber dam be applied and the cavity thoroughly dried with paper and air-syringe, we may find, by careful examination (what the tooth in a moist condition would have failed to exhibit), a thin line or fissure in the enamel, communicating with the cavity, which, although now is simply a crack and free from caries, would almost certainly in time be the means of conducting fluids to the interior of the cavity and destroying the filling, be it ever so good.

All who use the dam have frequently noticed this, and there can be no doubt, that formerly many a perfectly introduced filling has failed from this very cause, and both patient and operator were afterwards at a loss to account for the failure of what seemed to be such good work.

The importance of having a cavity not only free from caries, but also from connection with fissures or cracks in the enamel leading to it, is recognized by all good operators.

Again, in preparing cavities for filling, where there are natural fissures or furrows leading to such cavities, as in approximal cavities in bicuspids and molars extending on to the masticating surface, the real extent or condition of such fissures can hardly be determined while the tooth is in a moist condition ; but let it be dried, and their true nature can be determined with certainty. If the cavity be filled and the fissure

allowed to reman, should there be the slightest amount of decay or disintegration about it, that filling, sooner or later, will most certainly fail. Hence the importance, indeed, the absolute necessity, in such cases, of using the rubber dam to determine the true condition of such fissures, and, if found defective, of remedying the matter before the introduction of the filling.

Another great benefit that the dentist derives from the rubber dam, consists in his being able, by its use, to determine far more certainly and readily than formerly which teeth are affected by caries, and also the extent of the destruction that may have taken place. How frequently, after having removed superficial decay from the approximal surfaces of teeth, either by the use of the file or the corundum disk, have we noticed, after applying the dam and getting the surfaces perfectly dry, that there were still left those white, chalky spots, generally one on each tooth, indicating loss of vitality and incipient disintegration of the dentine or enamel.

Again, in those cavities extending along the gum on the buccal surfaces of the lower molar or wisdom teeth, where there is generally found a line of disintegrated enamel extending either way from the regular cavity, how often has every dentist found, after he supposed he had included all in his cavity, that, after placing the dam in position for filling, there was some still left that must be cut away in order to give the cavity perfectly good borders, and insure the success of the operation.

Besides these greater considerations, there are others of minor importance that are nevertheless valuable; such as relieving the patient of the necessity of having the mouth filled with napkins almost to suffocation; enabling her to occasionally close the jaws during a protracted operation, thus resting the tired and aching muscles; permitting the patient to relieve herself by the act of swallowing or spitting, and also of speaking to the operator, should occasion require it.

To the dentist it is also valuable in a less important manner, in enabling him to leave the patient in the midst of an operation to see after some other case of urgent importance, and also is the means of much saving of time in excavating a cavity, by keeping it dry all the while, and thus saving the time usually occupied by the patient in emptying the mouth of saliva, and the operator in again drying out the cavity to see to continue his work.

Such, then, are many, though perhaps not all, of the advantages accruing from the introduction of the rubber dam; and who will say, in view of them, that it is possible to over-estimate its value?

In addition to its own intrinsic merits, it acquires, in the eyes of the dental profession, additional value, from the fact that it was *given*, not *sold* to them.

Most of the inventions of the day are gotten up for the purpose of being a source of revenue to the inventor; not so, however, with Dr. Barnum. Led to the invention of it by the exigencies of his own practice, he no sooner proved its value than he, with unwonted liberality, gave it to the profession for their advantage and the good of mankind.

All honor, then, to the man who, in these degenerate days of selfishness and avarice, consulting rather the elevating of his profession and the benefit of humanity than his own personal emolument, gave to the profession of his choice, without compensation, the greatest boon it had ever received.

OXYGEN GAS AS A REMEDY IN DISEASE.

From New York Medical Journal.

By Andrew H. Smith, M.D.,

Member of the Academy of Natural Sciences, Philadelphia; Corresponding Member of the Gesellschaft fur Heilkunde, Berlin; late Assistant Surgeon and Brevet Major U. S. Army, etc.

CHAPTER V.—CONTINUED.

THE USE OF OXYGEN IN DISEASES INVOLVING DEFECTIVE NUTRITION.

Case IV.—In the case of the second patient there were crepitant *rales* in almost the entire extent of both lungs, with crackling at both apices, a frequent cough, an abundant expectoration, and a horrible dyspnœa, which compelled her to pass the greater part of her nights in her chair.

"There was a consultation, and two of our most eminent practitioners gave the most unfavorable prognosis. The patient went on from bad to worse, and at last the appetite failed altogether. I prescribed inhalations of oxygen . . . and they were regularly employed for about a month. The dose of the gas was at first about fifteen litres, mingled with air, then twenty, and at last forty-five litres were given, without any mixture. Under this influence the amelioration was rapid, the dyspnœa disappeared, the appetite returned, and the patient is now as well as possible, attending to all his affairs, and saying that he has never been better."

Case V.—The third case is a patient having tubercles at the summits of both lungs, and having, besides, hypertrophy of the he heart, with

violent palpitations, and a dyspnœa which would not allow the least exercise. He was submitted for a month to inhalations of oxygen, the cough diminished, the appetite, which was nil, returned, as did also the strength. At the end of three months the patient was able to take long walks without experiencing either dyspnœa or fatigue.

"In the case of the other patients the results were much less satisfactory. Three among them, having cavities, experienced a slight benefit; three others perceived no favorable effect whatever, without my being able to discover in the condition of the patients the difference in the results obtained."

I have quoted these cases in full, on account of the clearness with which they are described and the candor with which the writer relates his want of success in the larger number of his cases.

Birch relates two cases, in one of which "auscultation, percussion, and microscopical examination of the expectoration, confirmed the diagnosis as regards tubercular consolidation and central cavity. . . From the very first dose of oxygen a diminution in the sensations of irritation and weakness of the chest could be felt by the patient; within a month marked improvement evidenced itself both in the lung and general health, and at the termination of four or five months' steady treatment . . . the flattening" (of the chest) "had given way to almost perfect symmetry. . . . The following winter there was still some pain and sensitiveness to the impression of damp or cold air, but otherwise, with a little extra prudence, she enjoyed herself like others. Two years after the commencement of the oxygen she was quite well, married, and has ever since enjoyed good health." (Written eight years after.)—*Birch on Oxygen*, p. 121.

In the second case the upper third of the right lung was full of small cavities, and soon broke up into a large cavity, which, under the influence of oxygen, afterward contracted, causing considerable depression of the wall of the chest. Treatment was continued intermittingly for a year. Patient quite well six years after (p. 123).

During February and March, 1869, a series of experiments were tried at the New York Hospital, on the effect of oxygen in phthisis. Ten men, having phthisis in various stages, were placed in a ward together, and inhaled each about three gallons of oxygen morning and evening. This was continued for about four weeks, when it was found that six had gained in the aggregate forty-nine and a half pounds, while the remaining four had lost seven pounds.

In several of the cases there was a rise in the temperature after the

first three or four days, and the gas was discontinued for a short time and again resumed, after which the temperature remained as before the administration. A transcript from the hospital records will be found in the *New York Medical Journal* for September, 1869, and is worthy of attentive perusal. While the most prominent fact is the increase in weight, yet in several of the cases there was a very marked improvement in other respects, and that, too, when the patient had been growing worse up to the moment of beginning the inhalations.

In those cases in which the gas seemed to disagree with the patient it is probable that the result would have been different if it had been given more diluted.

The figures in Case V are very remarkable. "February 15th, weight 127 lbs.; March 5th, 124½ lbs.; March 10th, inhalation resumed, weight 123 lbs.; March 16th, 126 lbs." This is one of the cases in which oxygen at first disagreed.

The *Practitioner* for May, 1869, contains an article on the Inhalation of Oxygen, by Edward Mackey, Professor of Materia Medica and Therapeutics, Queen's College, Birmingham. Among other cases are mentioned three of phthisis, all benefited by the use of the gas. All gained in weight, one of them two stone. In two of these cases the disease remained arrested, the third died of pleuritis. Dr. Wallihan (*Chicago Medical Journal*, March 1st, 1869,) treated with oxygen two cases of what appeared to be incipient phthisis, one of them occurring in a person having a strong family tendency to the disease. In this case the cure appears to have been complete; in the other the patient, "with proper care and under favorable conditions, is in a fair way to live many years, and enjoy a fair degree of health." The oxygen was diluted with nitrous oxide. In both cases the relief was so immediate and decided as to leave no room for doubt that it was the result of the treatment.

Dr. Treskatis, of New York, has kindly allowed me to refer, in advance of publication, to three cases of phthisis treated by him with oxygen. In one of them the improvement was so great that a charlatan persuaded the patient that she had never had consumption, and induced her to give up the treatment. She, however, paid for her credulity with her life, as the disease soon recurred and proved fatal.

In the second case marked relief was obtained, though the patient ultimately succumbed, the case being from the first hopeless.

In the third case the oxygen was not well borne, did not give relief, but rather caused discomfort, and its use was therefore abandoned.

In a patient of Dr. Frauenstein, of New York, there was dullness at the apex of the right lung, with tubular breathing and moist râles, and accompanied by the rational symptoms of incipient phthisis. No other treatment was employed than the daily inhalation of from eight to twelve gallons of oxygen. In four weeks the abnormal auscultatory sounds had disappeared, and the dullness was scarcely perceptible. The subjective symptoms, such as dyspnœa on ascending stairs, etc., had also disappeared, and the patient had gained flesh.—[SECOND ED.]

The following cases are from my own notes:

Mrs. S., aged 28, was sent to me by a physician in this city, with the request that I would try the effect of inhalations of oxygen. She had had a distressing cough for three months, expectoration profuse, slight dullness, and tubular breathing at the summit of both lungs, extremely pale and anæmic, utter disgust for food, menstruation had been growing more and more scanty for some months past, and the last two periods had failed entirely. Three weeks before began the use of iron, but was obliged to abandon it, as it disagreed with the stomach and caused headache. Six hundred cubic inches of oxygen were inhaled every morning, mixed with about four times its bulk of air. For the first week little if any benefit was experienced; after that the appetite began to improve. On the tenth day of the treatment the menses returned, and were more abundant and of a better color than for many months previous. The appetite now became very great, the patient declaring that, when returning from the office, she could scarcely wait to reach home, so great was the desire for food. Iron was now borne without difficulty, but after two or three weeks she found that she could not take iron and the oxygen the same day without headache, but could bear either separately. At this time the cough improved rapidly. A simple expectorant mixture had been ordered, but was taken very irregularly. In six weeks from the beginning of the treatment the cough had ceased entirely, the patient had gained flesh and strength, and considered herself quite well. The treatment was then discontinued. Five months later she called at my office and reported that since I last saw her she had gained seven pounds, the menstruation had continued regular, and that, in short, she had never been better in her life. Respiration normal at the summit of both lungs.

Mrs. W., aged forty. Had been phthisical for eight years, having frequent hemorrhages, and being very much reduced in flesh and strength. The summer of 1858 was spent out of town, she being unable to bear the air of the city. While in the country she had a suc-

cession of hemorrhages which left little prospect of even a temporary rally. She improved somewhat, however, and returned to the city, where she passed the winter in a state of extreme feebleness. With the approach of warm weather she prepared to go again into the country, but before doing so decided to try the effect of oxygen, hoping it would take the place of a removal out of town. Accordingly, she inhaled twice a day about four gallons of the gas, and found her strength and appetite so much improved that the change to the country was abandoned. During the summer two very slight hemorrhages occurred, but her health in the main was infinitely better than the preceding year, notwithstanding the disadvantage of remaining in the city. She has continued the use of the gas, with occasional intermissions, up to the present time. She cannot omit it for more than a week without being sensible of a retrogression. Unfortunately, the physical signs were not noted at the beginning of the treatment, so that we can have no definite measure of her improvement. But the fact remains that the summer, which has always been the most trying season for her, has been passed with great comfort. That this was due to oxygen is shown by the effect of occasionally omitting its use.

On the 7th of December, 1869, I administered oxygen to Miss H., a patient of Dr. Frauenstein, of New York, aged about twenty-five. She was then extremely emaciated, had a distressing cough, and presented, as the doctor informed me, all the signs of pulmonary phthisis. After the first visit she continued the use of the gas, under the direction of Dr. F. The 3rd of January I received a note from the doctor, stating that the area of dullness in the lung was becoming less, and that although the cough continued, she was gaining flesh. He wrote : *She coughs and grows fat.* Three days later she called at my office. The change in her appearance was marvelous. Her previously hollow cheeks had become round and full, and her whole person seemed to have expanded. It was like the change one sees after recovery from a continued fever. Certainly up to this time nothing could be more gratifying than the progress of this case.*

In several other instances I have administered the gas to phthisical patients with considerable benefit, the cough being lessened and the

* This case has continued to improve. Dr. F. informs me that there is now (April 1st) a spot in the lung about three inches in diameter, which is still consolidated ; but that the cough and expectoration have ceased almost entirely. The appetite is good, and the sleep refreshing. The patient has resumed her occupation of saleswoman. She cannot, however, omit the gas for any length of time without feeling a tendency to a return of the symptoms, the appetite diminishing, and the sleep becoming less refreshing.—[SECOND ED.]

sleep improved, but circumstances have prevented continuing long enough to give decided results.

In other cases, there being no immediate benefit, the patients have become discouraged, and abandoned the treatment without giving it a sufficient trial.

It appears to me that, in the cases which have been mentioned, and which are far from embracing all of which have been more or less successful, there is much to encourage the systematic use of oxygen in phthisis. Indeed, considering the extremely limited number of cases in which it has been thoroughly tried, and our ignorance as yet of its proper management, the results may well challenge comparison with those from any other mode of treatment. While not prepared to indorse the opinion of Birch, that with the use of oxygen the cure of consumption in its earlier stages should be the rule rather than the exception, I have no hesitation in saying that I have more confidence in it than in any and all other remedies.

Even when it can do no more, it may procure a priceless boon—euthanasia. Often, even after the presence of the shadowy visitor is felt in the sick-chamber, reluctant life maintains a desperate struggle with its adversary, and the gasping sufferer lies for hours pleading for his release, the livid lips, the dilated pupil, and the convulsive breathing, bearing witness to his agony. In such a case the relief afforded by oxygen is beyond all price, as by it the horrible death by suffocation is exchanged for the peaceful falling asleep of exhausted Nature.—(See appendix, Dr. Roof's letter).

Anæmia.—From what has been already said, it will be seen that oxygen is admirably adapted to this affection. I might select numerous examples to illustrate its effect, but will confine myself to two from my own notes :

Mr. S., aged seventeen, upward of six feet high, has grown very rapidly in the last two years. Eighteen months ago he was attacked with malignant pustule affecting the cheek. He convalesced from this very slowly, and was still feeble when he was seized with articular rheumatism, from which he suffered nearly the whole of last winter. After all inflammatory symptoms had passed, the least effort would bring on excessive pain in the joints, so that he lay for weeks in an almost helpless condition. At last he became able to walk a short distance with the aid of a cane, but still suffered greatly from pain and stiffness in the right hip.

In this condition he first came under my care. He was pale and

anæmic, pulse 108, and so feeble that it would be lost every few seconds, and the counting have to be begun anew.

His appetite was good, and had been so during his whole sickness. Tongue clean, bowels regular. Had been taking iron and other tonics for a long time with no benefit. He began on the 27th of September to inhale four gallons of oxygen each morning. For the first two weeks the pulse fluctuated between 104 and 120, but by the third or fourth day it had gained decidedly in strength, and could be counted without trouble. His strength improved rapidly; he laid aside his stick, and was able to walk a number of blocks without fatigue. By the 25th of October his pulse had fallen to 84, and was of good volume and strength. The gas was then discontinued. He has now resumed his business of insurance broker, which he conducts with a great deal of energy.

Wilhelm N., aged twenty-eight, had been becoming more and more feeble and bloodless for four months, probably owing to the effects of syphilis, from which he had suffered severely, although there was no longer any external manifestation of the disease. Had been under the care of Dr. P. Hirsch, who gave him quinine and iron, which had benefited him slightly, but, as he was not progressing satisfactorily, he brought him to me for a course of oxygen. I first saw him on the 23d of November. He was then very anæmic, conjunctivæ and nails white, hands cold, pulse 96 and very feeble, no cardiac souffle. Had an absolute disgust for food, and was very restless in his sleep.

Gave him at once four gallons of oxygen, the inhaling of which occupied about ten minutes. To continue the use of tinc. ferri chlor. The following day the pulse had fallen four beats, and there was a little appetite. 25*th.*—A further decline of four beats in the pulse, appetite improving. 26*th.*—Pulse 84; appetite quite good; complains of constipation and headache; ordered ext. senna fl. 27*th.*—Pulse 96; bowels moved freely, but headache still continues. 28*th.*—Pulse 80; headache no better. To omit the iron. 29*th.*—Pulse 76; head still painful; ordered potas. bromide gr. x ter die. 30*th.*—Head somewhat better; pulse 84; appetite very good; nails pink; conjunctivæ still pale, but not so much so as at first. *December 1st.*—Head much better; strength greatly improved. *December 2d.*—No more headache; has an excellent appetite. From this time he steadily improved.*

*For three strongly marked cases of anæmia entirely relieved by the use of oxygen, see Dr. G. H. Butler's report in N. Y. Med. Journal, Feb. 1870.—SECOND ED.

ATTENTION ALL!

The Southern Dental Association holds its annual meeting at St. Louis, Mo., commencing Tuesday, July 28th, 1874.

The American Dental Association holds its annual meeting at Detroit, Michigan, commencing Tuesday August 4th, 1874.

The American Dental Convention meets at Saratoga Springs, Tuesday, August 11th, 1874.

THE BARNUM TESTIMONIAL

At the instance of the committee of the American Dental Association having charge of the Barnum testimonial, and with great willingness, we again call attention to their article on page 218 of June number of the MISCELLANY.—ED.

DOG DENTISTRY.

It is well known that the bites of rabid herbivorous animals are rarely dangerous, because their teeth are made flat-faced, for grinding their food without penetrating or tearing the tissues. Hence their bite is little more than a severe bruise, differing from that of a carnivorous animal, which pierces immediately through the skin. A veterinary surgeon of Paris, M. Bourrel, recently captured three mad dogs, and, tightly securing them, proceeded to file down the teeth. These animals he let loose with six other dogs. The latter were immediately furiously attacked and frequently bitten, but in no case did the pointless teeth inflict more than a bruise. Not content with this, M. Bourrel put on a thin kid glove and then worried the mad dogs with his hand until they bit him several times. Although pinching quite hard, the glove was not broken in a single instance, while the skin beneath was uninjured.

As to whether we had better substitute a city dog dentist for the present pound master, we leave the question to the humanitarians who are endeavoring to abolish carbonic acid and the muzzle.—*Scientific American.*

NOTES.

The following epigram was written for home consumption, but its wit and point will be appreciated wherever it is read:

Q——'s crooked phiz, by Nature's playful freak,
Had neither side alike—nor cheek for cheek;
Though modeled o'er by Kingsley's matchless skill,
And full restored—He's double-facéd still!

W. H. D.

Merchandise Mail.

In sending burs or other goods by merchandise mail, it is very necessary to paste or tie the *printed* name of the sender on the outside of the package (a business card will do), or to designate the contents by some number or numbers to correspond with a descriptive letter or postal card mailed at the same time. It will not do to *write* the name inside or outside of the package, as that will subject the whole to letter postage. If no name or number accompanies the package, it is often impossible to distinguish it from a half dozon packages containing "my burs to be sharpened" received by the same mail, no one of them bearing even the stamp of the post-office from which they were sent.

See article concerning postage, on page 79 February number of the DENTAL MISCELLANY — especially the sentence in italics.

A Case in Practice.

In the January number of the *Dental Cosmos* for 1872, under the head of Clinical Reports, by Dr. James E. Garretson, a case of neuralgia, dependent upon granules of Osteo-Dentine, was given. The rarity of this disease has led me to send the history of a somewhat similar case in my own practice.

Mrs. B———, aged 27, came to my office a few months ago for treatment. She was afflicted with severe neuralgia in the left side of the face, and of several weeks' standing. Upon examination I found that the left central incisor had been filled from the anterior approximal surface, but by an accident a portion of the tooth had been broken away, carrying the filling with it, and leaving a large dishing cavity.

The tooth was quite sensitive, but there was no exposure of the pulp. Upon percussion the patient would flinch a little, though she declared the tooth was not sore, but, to use her own expression, "it seemed big." Not knowing just the cause of the difficulty, or how to treat the case at the time, I filled the cavity with Hill's stopping, and told her to call again in a few days. Two days after, she returned, the pain was no better, and, if any difference, a little more severe.

After a second careful examination, I concluded to apply arsenic in the usual manner, to destroy the pulp, feeling sure the trouble lay in that organ, but in what form I was unable to say.

The next day she returned, saying the pain had entirely ceased, and upon extirpating the pulp a few days later, I found at the bottom of the pulp cavity (nearest the cutting end of the tooth) a little granule of Osteo-Dentine, about the size of a pin-head, pear-shaped in form, and having a semi-transparent appearance. I afterwards filled the pulp cavity and tooth with gold, and up to the present time it has given no further trouble.

JOHN S. MARSHALL.

Syracuse, N. Y.

American Dental Convention.

MR. EDITOR :

DEAR SIR : Permit me, through the medium of your influential Journal, to call the attention of its readers to the meeting of the American Dental Convention, which holds its twentieth annual session at Saratoga on the eleventh of August.

This organization has done much towards the elevation of our profession. Established upon democratic principles, opening its doors to all reputable practicing dentists.

If a tree is known and appreciated by its fruits, surely this Convention should occupy a prominent position in the dental world, numbering, as it does, among its members, many of the brighest intellects in our ranks.

The friends of the Convention anticipate a large attendance at its coming session. Dr. T. W. Evans, of Paris, is expected to deliver the opening address, and many of the most prominent and influential members of the profession will be in attendance, read papers, and participate in the discussions, etc.

The Transactions for the three past years are in press, and will be ready for distribution at or before the meeting.

A cordial invitation is extended to every practicing dentist who feels interested in and desires the advancement of dental science and knowledge, to be present and assist in pushing on the wheels of progress, and thus keep pace with the times, and with other specialties of Medicine and Surgery.

Let all who love our profession and its advancement be sure to be there.

J. G. A.

Kansas State Dental Association.

The third annual meeting of the Kansas State Dental Association convened at Topeka, on the 5th of May, 1874. The attendance was better than at any previous meeting.

The following persons were elected to membership: Dr. Young, of Emporia, Dr. Lawrence, of Manhattan, and Dr. J. Nichols, of Salina.

The following officers were elected for the ensuing year: President, L. C. Wasson; 1st Vice President, A. Doud; 2d Vice President, A. H. Thompson; Secretary, J. D. Patterson; Treasurer, A. M. Callahan; Cor. Secretary, J. B. Wheeler.

The retiring President, Dr. Griswold, delivered an excellent address.

During the session of the association the following were among the subjects of essays, and, with others of interest, received a full discussion.

1st. Pathology of Decay, by J. B. Wheeler.

2d. Career of Caries of the Teeth, by A. H. Thompson.

3d. Dental Tartar, by A. Doud.

4th. Dental Legislation, by J. D. Patterson.

5th. Deciduous Teeth, by O. C. McNary.

6th. Notes on Filling, by A. M. Callahan.

7th. A Case in Practice, by L. C. Wasson.

The next meeting, upon the invitation of Dr. W. F. Griswold, will be held in the City of Leavenworth, commencing on the first Tuesday in May, 1875.

J. D. PATTERSON, *Secretary.*

New Jersey State Dental Society.

The fourth annual meeting of this Society will convene at the Historical Rooms, Mt. Holly, on Tuesday morning, July 14th, 1874, at 10 o'clock, and continue during Wednesday, 15th, and Thursday, 16th.

The annual address will be delivered by the President, Dr. J. W. Cosad, Jersey City.

Arrangements have been made for good hotel accommodations at two dollars per day.

Dentists in the eastern part of the State desiring information as to the means of reaching the place of meeting, will communicate with Dr. Pinney, 740 Broad Street, Newark.

Clinics on Wednesday and Thursday mornings, by Dr. Thos. S. Stephens, of Trenton.

SUBJECTS OF ESSAYS.

1st. Oxychloride of Zinc, by Dr. D. C. McNaughton, Jersey City.

2nd. Alveolar Abscess, by Dr. W. E. Pinkham, Newark.

3rd. The Best Way to Save a Tooth, the Nerve being Exposed, by Dr. J. F. Fowler, Newark.

4th. The Morrison Engine, by Dr. E. M. Beesley, Belvidere.

5th. Contour Fillings, by Dr. J. Chadsey, Newark.

6th. Dental Instruments and Appliances, by Dr. J. Hayhurst, Lambertville.

7th. The Inter-relation of Medicine and Dentistry, by Dr. S. E. Arms, Elizabeth.

8th. Mechanical Dentistry, by Dr. R. V. Jenks, Patterson.

J. W. SCARBOROUGH, *Secretary*,
Lambertville, N. J.

Pennsylvania State Dental Society

The sixth annual meeting of this Society will be held at the Wyoming Valley Hotel, at Wilkesbarre, Pa., on Tuesday, July 14th, 1874, at 10 A. M. Session to continue at least three days.

Orders for excursion tickets can be had from the undersigned, (by enclosing stamp and stating route over which they are desired,) over the following railroads : Pennsylvania Central, Philadelphia & Erie R. R. Division to Kingston and return ; Northern Central to Sunbury and return. Tickets good from July 10th to 20th, inclusive.

Excursion tickets over North Pennsylvania and Lehigh Valley roads, can be had without orders, from Philadelphia and principal stations through to Wilkesbarre and return. Tickets good from July 11th to 20th, inclusive.

The above roads also issue regular "Summer Excursion Tickets" to Wilkesbarre.

All dentists and their families, who wish to be in regular attendance at this meeting, can avail themselves of the above excursion arrangements.

A number of interesting and instructive clinics will be conducted by prominent members of the profession.

SUBJECTS AND ESSAYISTS.

1st. Dental Nutrition, by Prof. G. T. Barker, of Philadelphia.

2d. Materials Used in Filling Teeth, by Prof. T. C. Stellwagen, of Philadelphia.

3d. Exposed Pulps and their Treatment, by H. W. Arthur, D. D. S., of Allegheny.

4th. Tin, by H. Gerhart, D. D. S., of Lewisburg.

5th. Histology, by Prof. J. H. McQuillen, of Philadelphia.

6th. Dental Therapeutics, by C. S. Beck, M. D., of Wilkesbarre.

The Wyoming Valley Hotel will furnish board at $3.00 per day.

W. H. SCHOLL, *Cor. Sec.*, *Reading, Pa.*

Fossil Edentates.

Prof. O. C. Marsh, in the current number of the *American Journal of Science*, describes some new fossil mammals, being edentates of a stupendous size. They go back very much farther, geologically, than any American species previously described. Some of them are from the Upper Eocene of Wyoming Territory.

THE
Morrison Dental Chair.

Price, $150.00. Boxing, $5.00. Spittoon Attachment, $8.00.

It possesses great superiority over any chair before offered to the profession, and is at the same time less expensive than any other first-class chair. Some of its points of superiority we here enumerate :

1st. All the advantages of any low-based chair, and also of any high-based chair, are here secured in a single chair. In it the patient can be placed lower than in the lowest-based chair made, or higher than in any other of which we have knowledge. At its lowest position the seat is fifteen inches, and at its highest position forty-two inches above the floor.

2d. The operator using the Morrison Chair can either stand or sit at his work, as he may choose, working with equal convenience in either position.

3d. It has been a very general complaint that dental chairs are too wide at the back, so holding the operator away from his work. Here this difficulty is overcome. The chair is narrow at the back, so that the operator need not stretch to reach the patient, but *can lower either arm of the chair out of the way* and so be as near the patient as he may choose.

4th. It can be changed from its lowest to its highest position in seven seconds—a celerity impossible in any chair raised by a screw.

5th. It can be very readily and perfectly adapted to operations on children of any age

First. Because in it the child can be raised as high as needed for the tallest operator.

Second. It provides a comfortable back and head rest, exactly as for grown persons.

Third. The footstool can be lengthened or shortened, to suit children of any size.

6th. The back of the chair can be lengthened or shortened rapidly and at will.

7th. The lower part of the back can be thrown forward to support the small of the patient's back.

8th. The chair, when adjusted to any position, is firm or steady wherever placed, and this is *especially true of the head-rest.*

9th. It occupies less room than any other operating chair.

10th. Although the footstool, when at its extreme length, is much longer than any other made, yet a person of ordinary weight can stand on its extremity without tipping the chair.

Nota Bene.—We have substituted brass cogs and castings, for those that experience has shown in any degree faulty, and the chair, *as now sold, is as strong as any chair made.* Reference is made to this because several of the chairs first sent out, failed in the cogs by which the chair is raised, and in the castings which throw the lower back-pad forward. These have been replaced in every instance with brass cogs, without charge on our part, and to the complete satisfaction of the purchaser.

We are gratified in being able to refer to the commendations, which follow, from some of the leading practitioners of the country.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

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10 W. 11*th St., New York, July* 24*th*, 1873.

MESSRS. JOHNSTON BROS., Broadway:

I find your Morrison Chair gives great satisfaction. My patients all admire, and voluntarily pronounce it the easiest they ever sat in. The movable back-piece, arms and foot-rest, which latter the patients can adjust at pleasure without changing their position, the lowering of the whole chair, which admits stepping into it without the slightest inconvenience, are points which call forth immediate praise from the patients, and give great satisfaction to the operator.

As a child's chair it is invaluable; the little patients can be "put just where you want them," while the operator can with ease change the position of the *whole* chair, without disturbing the patient in the least. These points, combined with others which it has, make this chair the most desirable of any which I have seen. Very respectfully yours, A. L. NORTHROP.

JOHNSTON BROS., *Hartford, June,* 15*th*, 1873.

GENTLEMEN: I have used the new Morrison Chair several hours every day since its arrival here, and feel in duty bound to say that there is no chair manufactured that can compare with it.

Its adaptability to children as well as adults, support for the small of the back—in fact, all its motions are perfect, and I see no chance for improvement. Dr. Morrison and yourselves have my heartfelt thanks for the great benefits you have conferred upon the profession in perfecting the chair as well as the Dental Engine. Very truly yours, GEO. L. PARMELE, M.D., D.M.D.

MESSRS. JOHNSTON BROS., *Hartford, July* 24*th*, 1873.

DEAR SIRS: The Morrison Chair meets all my expectations. I like it very much; in fact, I feel perfectly satisfied that I have one of the most complete chairs yet made for the comfort of patients and the convenience of the operator.

Yours truly, JAS. McMANUS.

JOHNSTON BROS. *Bloomington, Illinois, July 18th,* 1873.

I am well pleased with the Chair. Think it equal to anything that has ever come before the profession. Success to the inventor and manufacturer.

J. CAMPBELL.

MESSRS. JOHNSTON BROS., *Bennington, Vt., July 7th,* 1873.

GENTLEMEN : The Morrison Chair is the best I have ever used, and the most comfortable for patient or operator.

Yours truly, J. N. SCRANTON.

MESSRS. JOHNSTON BROS. *New York City, July* 25th, 1873.

GENTLEMEN : I deem it a pleasure to add my testimony as to the merits of the Morrison Chair. How can the intelligent dentist afford to be without it? Some of its merits are : The many comfortable positions in which the operator can place himself while operating, especially the low sitting posture; also the rapidity of movement and quick adjustment of the essential positions of the Chair, and a very comfortable seat for the patient during an operation. The Chair itself is a beauty ; thanks to the *inventor* and *manufacturer,* we now have a trinity in the dental world ; *the Liquid Gas, the Morrison Engine, and the Morrison Chair.*

Respectfully, C. BURNSIDE STODDARD.

MESSRS. JOHNSTON BROS. 28 *East* 13*th St., New York, July* 24*th,* 1873.

GENTLEMEN : In reply to your request for the opinion I have of the Morrison Chair, after a few weeks' use, I can say, first of all, that it is the easiest Chair to work over I have ever used ; and not only for the operator, but also for the patient. The adjustment of the parts, after a little familiarity, is most rapidly accomplished to suit almost any whim of either doctor or patient. There is a facility in bringing yourself and your patient into harmonious working relations, which can be understood only in its use. It is not necessary to speak in detail of its parts, which are familiar to all—only of the foot-rest, which seems most intractable of all, I have found perfectly convenient for all classes of patients. Wishing you success commensurate with your merits,

I am very truly yours, W. A. BRONSON, M. D.

MESSRS. JOHNSTON BROS. *Norwalk, Connecticut, July* 24*th,* 1873.

DEAR SIRS : In reply to your note of yesterday I would state that one thousand dollars would be no inducement for me to part with the Morrison Chair if I could not replace it. My patients are unaminous in their praises of the Chair, and all wish that they had one at home. I know of no greater praise or recommendation than that, that could be bestowed on any chair.

Yours in haste, THEO. E. SWIFT.

MESSRS. JOHNSTON BROS. *Lee, Mass., July* 26*th,* 1873.

DEAR SIRS : I am using the Morrison Chair, and find that it meets every requirement for comfort to myself and patients. It gives me pleasure to say that I consider it a perfect Chair. It has been regarded with uniform admiration by all who have examined it.

Very truly yours, H. H. FITCH.

MESSRS. JOHNSTON BROS. *Hartford, July* 25*th,* 1873.

DEAR SIRS : The "Morrison Chair" I consider the best, most convenient, and in all respects the easiest to adjust for dental operations, of any I ever used.

Yours truly, JOHN CODY.

MESSRS. JOHNSTON BROS. *Wooster, Ohio, April* 24*th,* 1874.

GENTS : I received your Chair, and am *well* pleased. Have used it for one month and cannot find an imperfection in it. So far as my experience has led me, there is not a requirement of an Operating Chair that it does not possess. I would not exchange it for any chair now manufactured.

Yours with respect, C. B. MOWER.

REMODELED
Morrison Dental Engine.

New York, May 25, 1874.

Johnston Brothers.

Gentlemen: You ask my opinion of the Remodeled Engine:

I have now used mine two weeks, and would say that its advantages to the operator over the old style are nearly as obvious as were those of the first Engine over hand work. John T. Metcalf.

The cut on the following page well illustrates the new Engine, and, with the subjoined description, will make the alterations plain to all.

DESCRIPTION.

1st. The rocking movement of the upright standard is abandoned, and a rigid, handsomely plated, and tapering column substituted.

2d. From the top of this column extends an arm directly in front of the patient. This arm swivels upon the column, and is adjustable vertically, being secured by a brace at any height desired, thus bringing its end directly in front of the patient's mouth, whatever be the height of the operating chair.

3d. Attached to the end of the adjustable arm by a most ingenious universal joint, is a shaft about twelve inches long (corresponding to the extension arm of the old engine), which carries at its end the handpiece.

a. This shaft, being short, is much lighter than the old one, enabling the operator more perfectly to feel his work, and is also less liable to tremor.

b. Both sides of the mouth may be reached without changing the position of the engine.

c. By lowering or raising the adjustable arm, according as the operation is upon the superior or inferior teeth, the driving spring is but slightly flexed, and great steadiness secured.

4th. The off-centre spring is attached above the driving wheel, partially supporting it and reducing the friction.

5th. The handpiece is much smaller, and the burs so secured that they may revolve in either direction, and at the same time be used either with a pushing or pulling cut, and this without the use of a catch spring. Old style burs can be refitted to this handpiece.

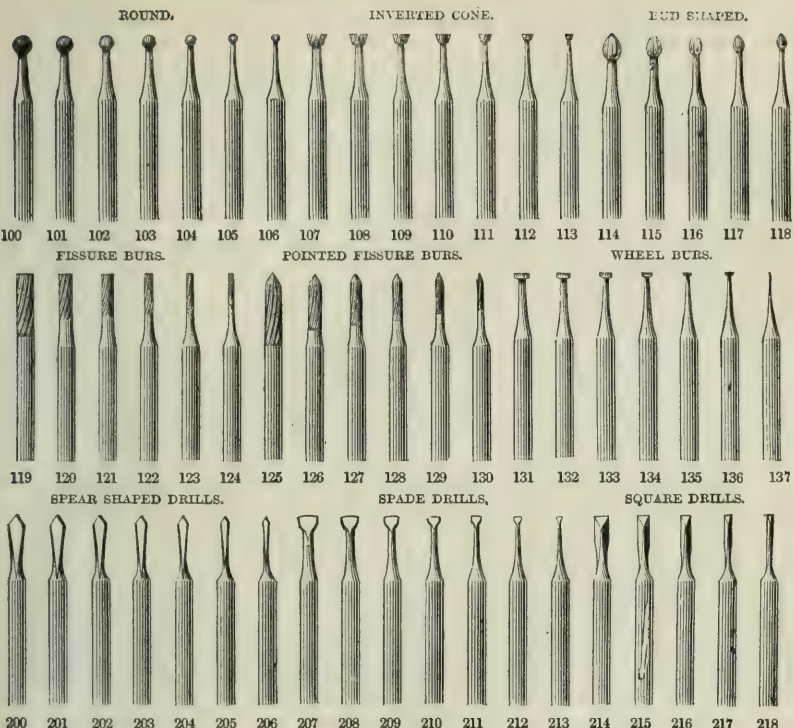
The model engine of this pattern, as above described, has been for several weeks in use in the hands of one of the best operators in our city, and is pronounced by him a very decided improvement.

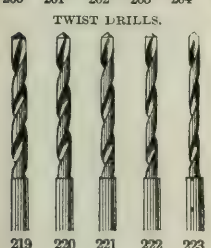
JOHNSTON BROS.

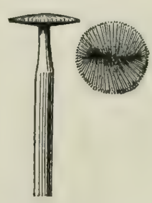
REMODELED MORRISON ENGINE.

Price, $60. Right Angle Attachment, $5. Boxing, $2.

CAVITY INSTRUMENTS.







Price, $1.25.

CAVITY INSTRUMENTS FOR RIGHT ANGLE ATTACHMENT.

We have in stock, and can furnish *Cavity Instruments* for the *Right Angle Attachment*, of all styles and sizes, from Nos. 100 to 218, inclusive.

SCOTCH STONES, MOUNTED.

The Scotch Stones enable the operator to give a finish to fillings hitherto unattainable, and only need a trial to be appreciated. We have these in stock of forms Nos. 75, 77, 80 and round. Other kinds of stones are now in process of manufacture.

HINDOOSTAN STONES, MOUNTED.

Forms of Nos. 75, 77, 80, and round. Of each shape we make three sizes. The cuts referred to by the numbers represent the large size. These are, beyond doubt, of the greatest utility in cutting either gold or bone. They last longer than any other stone.

LEATHERS, MOUNTED.

We have in stock Leather Points mounted on Mandrils, of forms Nos. 75, 77, 80 and round, designed to be charged with powders, for polishing and finishing fillings.

Screw Mandril. to be armed with leather, wood, etc., for polishing fillings, cleaning teeth, finishing plates, etc.

PRICES.

Finishing Burs,	Per dozen,	$6 00
Stoned Finishing Burs,	Each,	1 00
Cavity Instruments and Screw Mandril,	Per dozen,	3 00
Stoned Cavity Burs,	Each,	50
Right Angle Cavity Instruments,	Per dozen,	3 00
Leathers, Mounted,	"	3 00
Hindoostan Stones, Mounted,	"	6 00
Scotch Stones, Mounted,	"	3 60
Burnishers,	"	9 00
"	Each,	0 75
Corundum Points, Mounted,	Per dozen,	1 50
" " not Mounted,	"	0 75
Bands for Engine,	"	1 50
Twist Drills	Each,	40

IN ORDERING INSTRUMENTS, DESIGNATE THEM BY THEIR NUMBERS, AND STATE WHETHER THEY ARE WANTED TO FIT THE (A,) (B,) OR (C) HAND-PIECE.

Hand Piece, Style A.

Hand Piece, Style B.

Hand Piece, Style C.

☞ Our instruments are all made of the best Stubs' steel. We shall spare no effort to make them equal in every respect to anything offered to the profession.

☞ We are constantly adding new forms and sizes of Plug Finishing Burs, Cavity Instruments, Drills, etc.

DIRECTIONS FOR USING THE ENGINE.

1. In lifting the engine, be sure *not to bend* the arm which carries the hand piece.

2. Whenever the least noise is heard, oil the engine with the best sperm oil. The rapidity of motion renders oil a necessity.

3. The only part at all likely to break, is the small spring, which conveys power at the upper end of the hand piece. It is not soldered to the shaft, but is slipped on by hand. To put on a new spring, take hold of it near the end opposite that you apply to the shaft, and twist as if to *uncoil* the spring, at the same time pushing the spring on to the shaft. You will be greatly aided in removing the broken parts, by twisting, as if to uncoil, the spring. A piece of emory paper will be found convenient to aid in holding the polished shaft.

4. The engine, to run satisfactorily, should be oiled daily ; and the driving-spring should be perfectly straight.

IMPROVED INSTRUMENTS.

WE HAVE ADDED to our list three new and very popular sizes of Cavity Burs. One round called 106½, one inverted cone called 113½, one wheel-shaped called 137½. Each is smaller than any before made by us, of its shape. These numbers are neatly put up in dozen and half dozen packages, and are completely protected from oxidation and from rubbing against each other in transportation.

They are very popular, and we frequently receive orders from dentists for from one to three dozen of each.

STONED BURS FOR BURRING ENGINES.—For some time past, we have made to order, a Bur for use in Burring Engines, by the following process : The teeth of the Bur being laid out with extreme accuracy, are filed to *exactly the same length*, but are not brought to a cutting edge. The Bur is now tempered, and each tooth *afterwards stoned to a fine edge*. This secures a Bur perfect in all its cutting edges, and unequaled by anything hitherto offered in the market. Of these we are provided with a limited supply, of both Cavity and Finishing Burs, excepting Fissure *Burs*. (See Price List.)

THIN BOXWOOD DISCS for carrying Polishing Powder, to polish fillings in proximal cavities. These are of four sizes, from ⅝ inch to 1 inch diameter.

WE ADD THAT THE INSTRUMENT-STAND, elsewhere illustrated, will be found very useful for the convenient keeping of the Engine Instruments while not in actual use.

Besides the form represented in the cut, we have them with smaller holes, and very many more of them, so that each Bur may be kept by itself.

WE INVITE the fullest examination of our Engine Instruments, as regards

The quality of the steel from which they are made.

The shape and finish of the cutting edge.

Their temper.

The rapidity with which they cut.

Their durability.

The shaft of each instrument is *round and highly finished*, and can therefore be used without unreasonable and unnecessary injury to the nose of the hand-piece, which injury occasions unsteadiness in all the uses of the Engine.

They will *bear* examination in *quality* and *price*.

JOHNSTON BROS.

INSTRUMENT STAND FOR ENGINE BURS.

Price, $2.50.

No. 1 as above. No. 2 with many more, but smaller holes.

This is made of rosewood and maple in alternate layers, and is very ornamental. Besides the form shown above, we have another like this in all respects except that the holes into which the burs are placed are made so small as to hold only one or two instruments in each. We call this No. 2.

JOHNSTON BROS.

CARVACROL. C.^{20} H.^{14} O.^{2}

HIGHLY RECOMMENDED.

PROPERTIES:—Locally applied, Carvacrol, in full strength or diluted, seems to possess antiseptic, disinfectant, sedative, mildly caustic and escharotic, gently styptic, stimulant, irritant and rubefacient properties.

Carvacrol, as a substitute for Glycerole of Thymol and Creosote or Carbolic Acid, in cases of Odontalgia, Sensitive Dentine, Alveolar Abscess, "Canker Patches," etc., may be locally employed in the same manner.

As a gargle for Tonsillitis and inflamed mucous membranes, it may be employed in the proportion of about three drops to the ounce of water, or the strength can be increased when more powerful action is required.

Price per Bottle, $1.00.

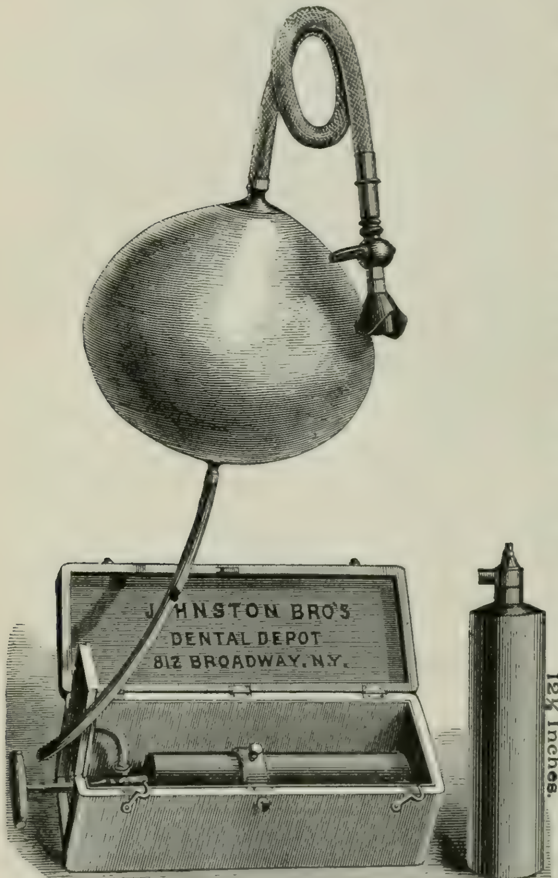
H. L. SAGE, D.D.S.

For Sale by JOHNSTON BROS.

LIQUID NITROUS OXIDE.

[Revised Circular.]

The increased and still increasing demand for Pure Liquid Nitrous Oxide, and for information concerning apparatus for its exhibition, renders it necessary that we issue yet another edition of our circular upon that subject As the Surgeon's Case, as first introduced, has proved itself in every way all that we could wish it to be for the place assigned to it, we cannot do better than to repeat here our first description of it.



SURGEON'S CASE.

This comprises a strong cylinder containing One Hundred Gallons of Gas; a strong morocco covered case, provided with an iron ring and set screw, by which the iron cylinder is held in place during use, and its delicate valve protected from injury; also, a rubber bag with rubber tube at one end for admission of gas, while an inhaling tube, handsomely covered on its outside, and provided against any possibility of a collapse by a tin-coated spiral of wire on its inside, is fastened at its opposite end—an inhaler—a nickel-plated wrench and a nickel-plated key. In fact, *all* the apparatus necessary for administering the gas. The whole case and contents weighs about fifteen pounds. This is here shown as open, and the bag which receives the gas from the cylinder, and from which it is exhibited to the patient, is represented as filled, and suspended above the case. The cylinder is also shown as standing at the side of the case. This is the simplest and most popular form of apparatus, and will be everywhere welcomed—because of its portability for use outside of the operating room.

REVISED PRICES.

Complete Apparatus — Surgeon's Case, with Metallic Inhaler. . . . . **No. 1.**	$42 00
Complete Apparatus—Surgeon's Case, with extra sized Bag and Metallic Inhaler. . . . . **No. 2.**	45 00

Boxing either, $1.00.

Each complete apparatus includes a 100 gallon cylinder, filled with Liquid Nitrous Oxide.

Cylinder with 100 gallons of Gas.	16 00
Refilling Cylinder.	6 00
Morocco covered case, with ring and thumb screw, velvet lined,	12 00
Polished bl'k walnut " " " " "	13 00

Of these latter we have only a limited number.

Rubber Bag, with covered inhaler tubing, (about 4 gall. capacity)	5 00
Rubber Bag, with covered inhaler tubing, extra size.	7 00
Inhaler, with spring valves, trumpet mouth-piece, with Plated connection.	8 50
Inhaler, latest style, with two way stop cock, adapted to the use of both dentists and surgeons, with connection.	9 50
Key, Nickel Plated.	1 50
Wrench, "	50
Union, Nickel Plated, (nut and tube), for connecting cylinder and gas bag.	1 50
Covered Inhaler Tubing, per foot.	50
Plated Connection to fit old style Inhaler.	1 00

REMARKS.

When the side of a bag has been perforated, it cannot be repaired, but should be replaced. Send on the tubing by mail, and the bag will be replaced. Price.	3 00

As this cannot be done *properly* except by the use of rubber cement, and by persons experienced in the business, we think it every way advisable that it be entrusted to the rubber workers, and not attempted by the dentist.

JOHNSTON BROS.,

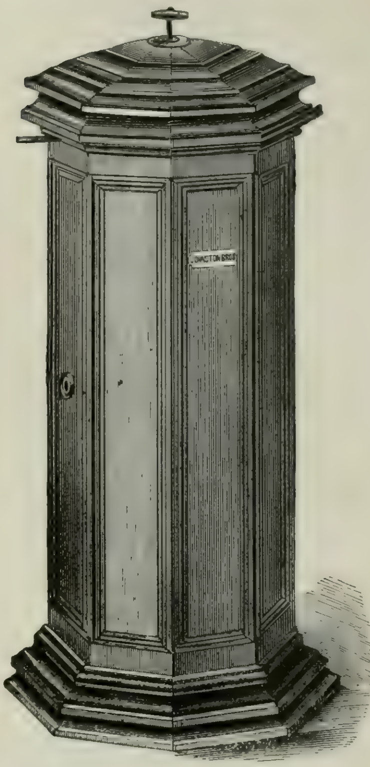
812 BROADWAY, N. Y.

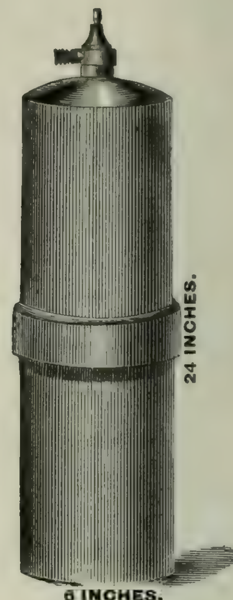
ONE THOUSAND 1000 GALLONS GAS,

LIQUID NITROUS OXIDE.

1000 GALLON CYLINDER CASE.

Price, $30.00. Boxing, $2.00.





1000 GALLON
CYLINDER.
Price, $36.00.
Boxing, $1.50.

Gas in 1000 gallon lots, 4½ cents per gallon.

The above illustrated apparatus is especially desirable where large quantities of nitrous oxide are used, or where it must be sent a great distance. In this form it is best to ship it by *fast freight*—which makes the cost of transportation very light.

THE GAS CAN BE KEPT FOR ANY LENGTH OF TIME,

AND IS

CONSTANTLY ON HAND AND ALWAYS OF THE BEST QUALITY.

PRICE LIST OF A COMPLETE OUTFIT.

1 Black Walnut Paneled Case, octagonal	$30 00
2 1000 gallon Cylinders at $36 00	72 00
2000 gallons of Gas at 4½ cents per gallon, being 25 per cent. less than price in small cylinders	90 00
1 Bag, with covered Inhaler Tubing	5 00
1 Bag, extra size, with covered Inhaler Tubing	7 00
1 Key, Nickel Plated	1 50
1 Wrench, Nickel Plated	50
1 Union, " "	1 50
1 Inhaler—Metallic—with two way stop-cock and connection	9 50
	$217 00
Deduct Gas	90 00
Cost of Apparatus	$127 00

By purchasing under this plan a saving of 25 per cent. is effected in the cost of the gas, or on 2,000 gallons of $30.00.

It is right that we should here announce that we have in hand a piece of furniture, which—while it will answer the purpose of the black walnut case illustrated—will also serve as a stand for an ornamental Gasometer.

A cut of it will appear in an early issue of the DENTAL MISCELLANY.

As these large cylinders can easily be sent by fast freight (*the* 100 *gallon size is too small to be so risked*) cost of transportation is reduced to its lowest rate.

JOHNSTON BROTHERS,

812 Broadway, New York.

PORCELAIN TEETH.

Our stock is carefully selected from the factories of the BEST MAKERS, and embraces all of the varieties in use, including Continuous Gum Teeth. We will fill orders on short notice for any manufacture of teeth.

Dentists sending us their orders can rely on receiving prompt attention, and on getting manufacturers' best rates.

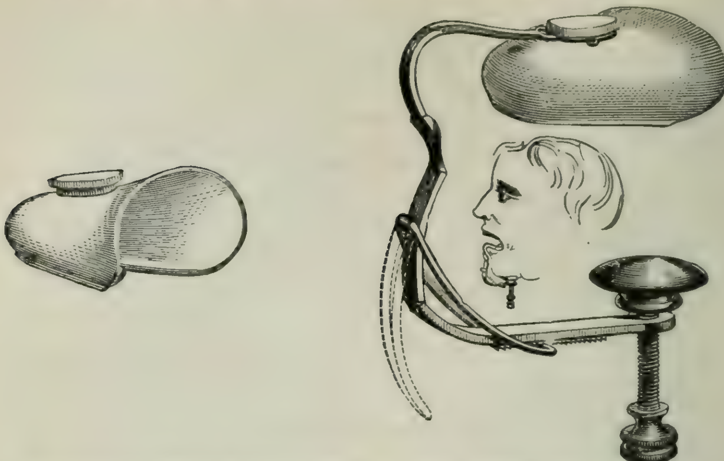
JOHNSTON BROTHERS.

DENTAL GUM—RED.

Johnston Bros.' Nos. 1 and 2, per lb	$2 50
E. Dougherty's Nos. 1 and 2, per lb	2 75
American Hard Rubber Company's, per lb	2 50
Whalebone Rubber, per lb	3 50
Dental Gum—black—per lb	3 00
Gutta Percha, per lb	3 00

JOHNSTON BROTHERS.

OSBORN'S TONGUE HOLDER.



Osborn's Tongue Holder and Duct Compressor. Is Cleanly, and Reflects Light in the Mouth.

This is by far the best Tongue Holder and Duct Compressor ever offered to the profession. The cut exhibits one adjusted as when in the mouth, also a view of one in use.

It possesses the following advantages, in addition to those of other apparatus designed for the same purpose.

1st. It covers the tongue, and so completely protects it from accident, while at the same time permitting to the patient some chance for changing its position *inside of the cup.*

2d. The cup which covers the tongue being of the finest white porcelain, *reflects light in the mouth*, and so *greatly* aids the operator.

3d. The cups can be readily and perfectly washed, and the use of the apparatus is therefore far less objectionable to the patient than is that of the ordinary metallic tongue holder.

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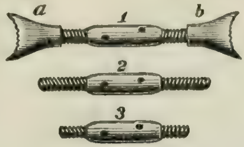

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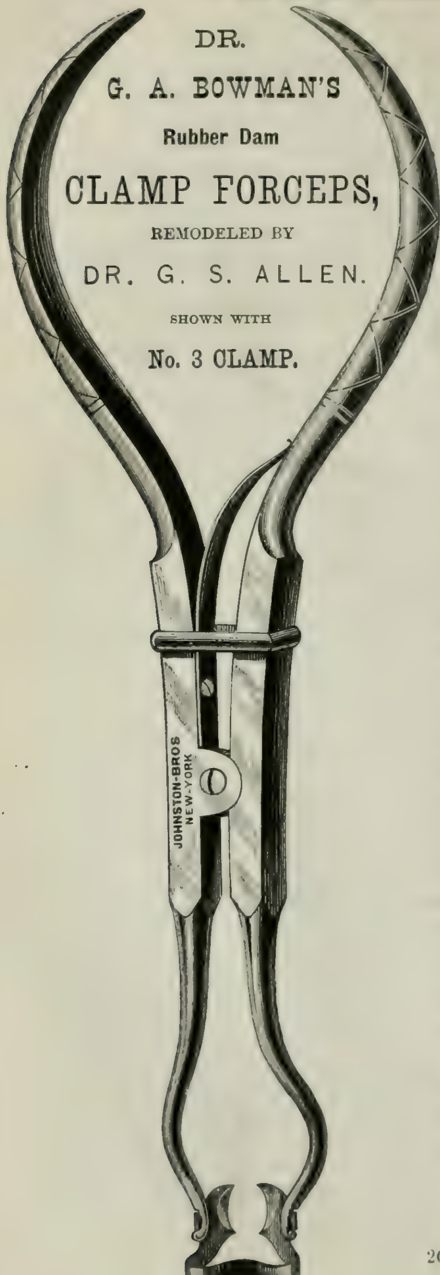

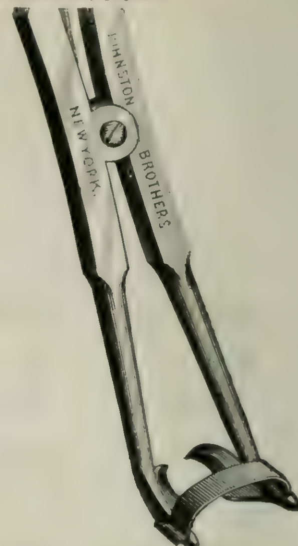

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Clamps, each..................	50
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IMPROVED
Rubber Dam Clamps,

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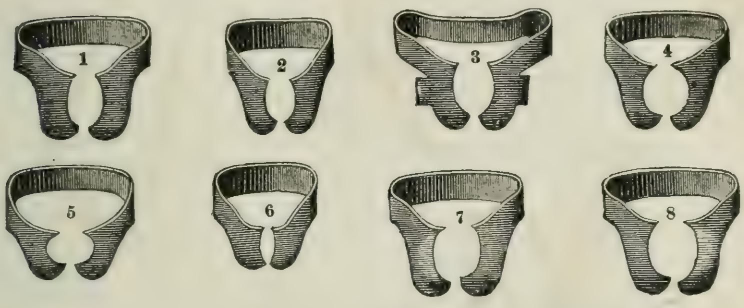

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These Clamps are designed to be placed on the tooth at the commencement of the operation. Afterwards apply the Rubber Dam by passing it over both tooth and clamp.

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CHEMICAL AND GALVANIC ACTION UPON TEETH AND THE MATERIALS USED FOR THEIR PRESERVATION.

By S. B. Palmer, of Syracuse.

Read before the New York State Dental Society, June, 1874.

The dental profession, in consequence of its recent origin, is divided into two distinct classes. First, those who have grown up with, and into practice, having received such instruction as a few years office service and a limited library could offer; and second, those who have enjoyed the advantages of a regular course of professional study. Many, it is true, have overcome these early disadvantages, by close application, observation and study, so that in the ordinary discharge of their duties, little could be charged to early neglect, yet, upon the subject of Dental Chemistry, there must ever remain a distinction.

Private reading and experiments, conducted with the apparatus usually at hand in ordinary practice, cannot be as impressive and thorough as lectures and demonstrations before a class. The terms and symbols most expressive of ideas to the chemist, would fail to interest or instruct those who have not pursued that branch of education.

The matter contained in this paper, therefore, will be presented in language intended to convey our meaning, rather than to appear studied. It is also the result of observation and experiments, rather than from general reading.

We will endeavor to confine our remarks on chemistry to the department relating to our specialty, yet, in order to be understood, we are compelled to refer to the rudiments, that we may know what simple elements enter into combination in the formation of the dental organs.

Chemistry teaches that all matter of which we have any knowledge,

is composed of sixty-three or more simple elements. From this small number, by various combinations and proportions, comes the countless thousands of mineral, vegetable, and animal forms which comprise, surround, and inhabit the globe.

About three-fourths of this number of elements are classed as metals, one-fourth non-metallic, or metalloids. In their pure state, or simple form, little knowledge would be required to classify them accordingly. The elements relating to Dental Chemistry probably do not exceed a dozen; in fact, it is claimed that thirteen only, called the Zoonic elements, taken from both classes, form all the structures in which life is manifested. These figures, as all know, are obtained by analysis, which term is derived from two Greek words which signify *up*, or *back* to its source, and to *loosen*, which means to reduce any compound substance into its simple or primary elements.

Let us consult our Dental Dictionary, Dental Chemistry, or writings upon the structure and analysis of the teeth, and what is given? You are all familiar with those tables, so that I will not copy them, or the proportions there given. We read in Dental Chemistry the analysis of the human dentine as given by Berzelius consists of cartilage and vessels, phosphate of lime, fluoride of calcium, carbonate of lime, phosphate of magnesia, and soda, with chloride of sodium.

Who knows by this analysis what simple elements enter into human dentine, or into the enamel, or cementine, by the analysis given of them? Those who understand Chemistry, and such only. The fault is not in the stinted analysis, but in the ignorance of him who cannot comprehend. We would not lower the standard of language and symbols used in chemistry, but rather become so elevated as to comprehend them. The chemist, in looking over the above analysis, would readily understand that dentine is composed of phosphorus, fluorine, calcium, carbon, magnesium and sodium.

Let us analyze carbonate of lime, a component part of the teeth, also of the saliva calculi, as well as limestone and marble. Take a piece of marble and apply heat, as is done in all our lime-kilns, and we have two unlike substances, a gas known as carbonic acid gas, and quick-lime. The gas, if treated by heat, according to chemical instruction, is separated into carbon and oxygen. Send a current of electricity through the quick-lime; it results in the white metal, calcium and oxygen. Here, all further attempts at division or destruction fail. Carbonate of lime is therefore composed of carbon, calcium, and oxygen, three simple elements. Having briefly considered the manner in which

we treat compounds in order to ascertain the elements of which they are composed, for a moment we reverse the process. Compounds are formed from simple elements. This is called synthesis, going from simplicity to complexity, not merely to reproduce substances which have been analyzed, but to form new compounds not found in nature, such as soap, glass, etc. There appears to be no limit to the combinations and changes which may be produced by the union of these elements—allowing that we use only the thirteen that enter into living forms.

In the characters representing Morse's Telegraph alphabet, there is the dot, dash, and space. By various arrangements of these three symbols, all the letters, numerals, and signs, are represented, and give expression to quite a portion of our daily news. So with the elements under consideration, by the laws of affinity they unite in certain proportions, which may be determined with mathematical accuracy. What affinity really is, we cannot say; we only know that it is a force in nature, to be classed with cohesion, gravitation, magnetism, etc.

The chemist cannot create anything; but from the elements at his command, by the aid of affinity, from sand and alkali there comes glass; from alcohol and lime, chloroform is produced, either of which are not found in nature, and are wholly unlike the elements from which they are composed.

Take for illustration, sulphur, which is yellow, and quicksilver, which is of a bluish white; unite them by heat, the result is bright vermilion, such as colors rubber red. Nitrogen and oxygen, which are tasteless, when combined in equal proportions give nitrous oxide, which is sweet. One part nitrogen and five of oxygen combined, give nitric acid, which is intensely sour. That eight parts of oxygen and one of hydrogen, produces water, is a fixed law, the world over.

Elements combine in different proportions according to law, producing different compounds, according to the varying quantity.

Let us apply the facts already stated to the subject before us, bearing in mind that all matter is subject to various kinds of attraction known as gravitation, cohesion, and chemical affinity.

The latter is only perceived where particles of matter are brought into immediate contact, differing from cohesion in that its action is based upon dissimilar particles, while cohesion acts upon similar ones, and from gravitation in that it acts at perceptible distances. As already stated, dentine is composed of phosphorus, fluorine, calcium, carbon, magnesium, and sodium, not taking into account the oxygen, hydro-

gen, nitrogen, and other elements found in the cartilage and vessels. By the action of chemical affinity, these dissimilar elements, being furnished by the blood, as we believe, become polarized, and unite in a compound to form dentine. It is, however, necessary to become hardened, which is accomplished by cohesion, aided by the vital or organic principle employed in hardening bone. We must bear in mind that elements combine on their liking, or love at first sight, and are ready for a divorce if brought in contact with a more congenial affinity.

Alcohol and camphor gum will hold most peaceable relations unless water be added; in that case the alcohol will unite with the water, and at once reject the camphor, which will appear in white flakes upon the surface. This process of the union of elements is called combination. The breaking up of the combination is called decomposition. All we have said thus far may be of little account to the practical chemist, What we have to say would be of less importance to those who are not acquainted with the subject without it.

In considering the teeth and their structure, we present only a chemical view of the subject, referring, as may be necessary, to the pathological condition as represented in decay or decomposition. We have mentioned that tooth bone is composed of certain elements combined by chemical laws, also that it is a law that decomposition takes place in existing compounds when new elements, or a combination of elements, are introduced for which there is a greater affinity than for the original.

All the varying forms of caries noticed in the teeth, are effects of certain causes, or the expression of a chemical law. Teeth are composed of the same elements, varying perhaps in density, vitality, or powers of resistance, so that when we see "black decay," we know the causes which produced it, were unlike those, the effects of which are exhibited in the "brown or white decay," indicating that there is knowledge to be obtained respecting such agents. We are now treating of bony tissues which are composed of animal matter, combined with earthy salts, endowed with vitality.

As already shown, such compounds are held in a normal condition by the united influence of affinity, cohesion, and vital force. It is the presence of the latter that makes our experiments upon devitalized dentine so unreliable. The living stomach which contains the liquid that aids in digesting the food there introduced, is itself destroyed by the same fluid when deprived of vitality. There are four distinct appearances, indicating decomposition of dentine, known by the terms "black, brown, and white" decay, and "chemical abrasion."

In the black, there is less breaking down of the tooth structure. To all appearances a change takes place in the elements to render the disorganized portions electro-negative, by which the progress of decay becomes arrested, and we find such indications far more favorable than we look for in the brown or white where the dentine is acted upon as far as the disease extends, or in chemical abrasion, where the entire tooth substance is dissolved, almost to the extent of the parts affected.

At the commencement it was our intention to experiment with such articles as are known to produce chemical action upon teeth, and, if possible, ascertain the specific cause of each of the above named kinds of decay, although we would have been anticipated by another whose knowledge of chemistry enables him to determine the effect of such combinations with less labor. The subject would lose none of its freshness if re-examined, as the result of experiment. We had not proceeded far before we lost our reckoning, laid aside our chart, and commenced to run new lines.

The galvanometer we employed to detect electric currents, evolved from contact of opposite metals, as faithfully pointed out chemical action in general, not only as existing between articles of food and drink, but between gold, tin, and materials used for fillings, and the tooth itself. Whereas we have formerly looked for the third element necessary to form a battery, in the particles of food that became lodged on or near the plug, we now look to the tooth in which the plug is inserted.

With galvanism, as in chemistry, some knowledge of the rudiments must be entertained. It is well known to every one of intelligence that two metals immersed in a solution that excites one of the metals and not the other, or even both unequally, that a current of galvanism or electricity is evolved. Thus, copper and zinc suspended in acid, forms a battery for mechanical purposes. It is not so well known that carbon, animal fibre, aqueous solutions, are also subject to galvanic action. The term positive and negative applies to the current and to the elements active in producing the current. The metals and all substances may be arranged in a general order, as they stand to each other, beginning with such as gold, platinum, silver, carbon, copper, and many others which would be negative to zinc, potassium, etc., which are called positive.

This term will only apply to certain substances ; in certain exciting solutions, the order may be changed ; as a general rule the greater the difference between the elements, the better the results, or more powerful is the current.

For this reason platina and carbon plates are used as negatives, with zinc as a positive; the latter only, is oxydized or consumed. This term named positive, and negative is manifested in various ways, and in other forms, it is seen in the workings of chemical affinity, by union of unlike particles of matter, in the two poles of the magnet, and in frictional electricity excited on glass, or resinous surfaces

By the galvanometer, we test such articles of food as habit or "natural selection" prompts us to partake of, in pairs, and we find the exquisite relish they impart, due to a galvanic action, by union of the positive and negative elements, quite agreeable to the taste, as in pepper and salt, sugar and coffee, sugar and lemons, ham and eggs, etc.

Articles of food done brown or crisped, such as toast, broiled or roasted meats, griddle cakes, etc., are semi-carbonized; the brown surfaces are rendered negative, to the other portions of the same articles not crisped.

The complaint of the Englishman that our "*hale* don't taste as it did in hold Hingland" is just enough, but the fault is really in the substitution of glass for the pewter mugs used in English ale-houses. The pewter mug in contact with the lips, forms a battery that electrifies and imparts life to the ale or cider, not experienced in the use of glass cups. Many articles that we never thought of in connection with galvanism, are found to be elements for batteries; in fact, chemical action and the electric current stand in the same relation to each other, as do electricity and magnetism—inseparable. This brings us to consider the action of these forces upon the teeth. We adopt the theory that chemical action which results in the disorganization of the teeth, is stimulated generally by acids. An investigation of the constituents of tooth bone and its surroundings, warrant such conclusions, and numerous recorded experiments attest the same. Calcium, magnesium, and sodium, are ingredients of dentine; the saliva in which teeth are bathed is usually alkaline; the calculi which becomes attached to the teeth, is also of the same nature, having no chemical action upon the bone or dentine. Having decided that these agents are acids, how do they find their way to the mouth?

We will not go through the long list of "ways and means," by which to account for such presence. Chemically speaking, the oral cavity is an electro-chemical cell and laboratory, in which nature employs certain forces, that act by laws as inflexible as nature herself. A wide range of elements, both simple and compound, are there introduced. Mechanical force for crushing and pulverizing is furnished in mastication; heat and moisture is not wanting to facilitate fermentation.

Chemical affinity and electricity are present to take down old compounds, and build up new ones; even the teeth themselves escape not the action of these forces. The galvanic current is the one prominent force of chemical decomposition, particularly of binary compounds. A knowledge of the laws governing these forces gives the most satisfactory answer for the presence of acids in the mouth. Saliva contains chloride of sodium and soda; galvanic currents decompose this compound, the chloride unites with the hydrogen derived from the water of the saliva, and hydrochloric acid is the result. We have sent the current from two cells of Daniel's battery through litmus paper wet with saliva, and been able to write in acid, characters with the copper wire forming one pole of the battery. Hydrochloric acid is the result of decomposition of saliva by the current. The singular combinations of nitrogen and ogygen as satisfactorily explains the manner in which nitric acid finds its way to the teeth.

One part of nitrogen and one of oxygen combined forms nitrous oxide; one of nitrogen and two of oxygen, nitric oxide; one of nitrogen and three of oxygen, hyponitrous oxide; one of nitrogen and four of oxygen, nitrous oxide; one of nitre and five of oxygen, nitric acid. No matter how low down this combination originates, the tendencies are to produce the highest—nitric acid.

Abundant material is furnished in the lodgment of meat fibre, rich with nitrogen, also in other articles of food that are permitted to decompose between the teeth. Let us now consult the teachings of the galvanometer respecting chemical action, or galvanic action between various fillings and the teeth. We have been taught that dentine, like bone in general, is not a conductor of electricity, therefore is not directly acted upon by the galvanic current. To form a galvanic battery it is necessary to have three elements. Two of them need to be what is termed perfect conductors, one imperfect, or one perfect and two imperfect. In the mouth the saliva and mucus would be imperfect, while a filling and such food as meat would be called perfect. Before we could bring galvanism to bear upon dentine, there must be a battery of the plug, food and saliva, and the action depended upon the acid formed by such battery to dissolve the lime salts composing the teeth.

The galvanometer teaches that the filling and tooth in which it is inserted, or an approximate tooth, are sufficient for two elements, the saliva or food forming the third, or by union, a more complex current may be established. We take gold foil as a unit, or negative element for our experiments; with it and tin, we make a test and pronounce tin

positive to gold, or, in chemical language, it is an *electrolyte*, a substance that is oxydized, or, if a compound, that is decomposed. We take teeth and pound them in a clean wedgewood mortar somewhat fine, and connect the pieces with the gold, using diluted sulphuric acid, and we find tooth bone, also an electrolyte, or positive ; the gold will remain a negative. Between the tooth and the gold, the action of the needle will be slight ; between the tin and gold, very great. The tenth part of a grain of each will deflect the needle fifteen or twenty degrees. The next test is between tooth bone and tin foil. Let us repeat the statement already made, the greater the difference between two elements, the stronger the current.

The tooth and tin are both below the gold, and both declared positive to gold, therefore electrically nearer to each other than either is to gold. The trial of tin and the teeth show but a slight difference, the tin occuping the place of gold, still throwing the action and consumption on the side of the tooth.

We try another experiment and substitute alkali for acid, and the current is reversed ; the bone now occupies the negative, and the tin the element oxydized. Thus we have to say that there is less galvanic action between tin foil and tooth bone, than between gold and tooth bone. In other words, a loose porous tin filling would be better in a tooth than a gold one in the same condition. If the saliva be alkaline, the tin might be blackened and wasted away, while this action would throw the tooth into the electro-negative condition to be preserved. In an acid saliva the tin would be oxydized upon the surface, and by that means form an insoluble compound to greatly lessen further action. Let it be understood, I am not declaiming in favor of tin over gold in filling teeth, and will not attempt to defend the position here taken. I give the results of numerous experiments as I read them. "Thus saith the Lord" through the magnetic needle.

I am convinced that gold, being so far superior to tooth bone, throws the latter into positive relations with itself, be it in a poorly applied plug, or in approximate relation to another tooth, or in a clasp for the support of an artificial denture. In the latter case we need not look for base solder to prompt the action. The only remedy I can discover to correct the evils that arise from this source, is cleanliness and perfect fillings. A gold filling so imperfect as to show discolor, will in time enlarge the cavity.

We now come to amalgam. Here we would gladly close, having no desire to reopen the "amalgam question."

It is universally admitted that mercurial compounds are generally poisonous, therefore it is of the utmost importance to all who use it, to understand, as well as may be, the condition or combinations that prevent evil. There are two manifestations of its baneful influence, one by constitutional disturbances producing ptyalism, the other local, bringing evil to the teeth and pulps with which it comes in contact. The former subject has time and again been argued, and still remains an open question; chemistry is arbitrary and testifies against it, and observation leads us to believe the charge of salivation not without foundation. We are now confined to its local effects upon the teeth. As we have conceded the possibility of ptyalism by its use, we must also state circumstances in which it has the power to destroy the tooth in which it is inserted.

Mercury is a simple element; re-distilling cannot change its nature, while uncombined. If not itself poisonous, most of its compounds are; if we use it, therefore, all we can hope to do is to so lock up the compound, or mechanically inclose it in some other substance, that none of the mercury can leave the mass. Its compound, vermilion, is so effectually encased in red vulcanite, that fine scrapings of it, treated with hydrochloric acid or fruit acids, fail to affect the needle of the galvanometer. Fillings of that nature would have no action upon the tooth. Unfortunately a tooth containing an amalgam plug, has in it the elements of a minute yet intense battery, capable of decomposing not only the plug, but the tooth around it; this is in accordance with a law of chemical affinity. The best thing we can do is to use chemical affinity to blend or combine the various elements before they enter the tooth, so as to represent as nearly as possible but one. Chemical affinity cannot be cheated of its action, and the greater number of elements there are in a battery, the greater number of currents and counter currents there will be; and galvanic action takes place on all surfaces of the mass, and within, as far as moisture extends, we look in vain for amalgam plugs to be bright on the surfaces in contact with dentine.

The action is between the compound and the mercury, while in tin, only the outer surface is acted upon; that is, tin or gold represent one element each, and before any galvanic action can take place between such plugs and dentine into which they are inserted, there must be space for a fluid to excite action. With amalgam, the moisture in the tooth bone is sufficient to communicate the current which exists in the plug, to the tooth, and thus enlarge the cavity, or diminish the plug, or both. The compounds furnished for amalgams have been greatly improved.

As we are told, one metal is added to hasten setting, another to prevent shrinkage, another to give the required hardness, etc., and have no doubt these desired properties have been combined, but when we look at this statement by the aid of the *electroscope*, we are reminded of a medical preparation, advertised as a universal panacea, warranted to contain thirty different remedies. The fact is, the addition of metals to a compound, only complicates galvanic action. We can only lessen that action by compounding and blending the elements as much as possible. To illustrate, melt together lead and zinc, there is a compound, but not a change in either metal; heat the cast to the point at which lead fuses, and it will be forced out from the zinc to be visible. Melt and cast into a heated mould; when cool, the lead will be found at the bottom by reason of gravitation; even gold and silver can be perfectly separated by nitric acid. Who has the wisdom to so proportion the various metals used in an amalgam, that they become as one by the laws of chemical affinity? Allowing that such ends may be obtained, we then have a compound with mercury.

The property sought in an amalgam, is plasticity; to secure this, the process of combining must be completed after its introduction into the cavity. Any hasty compounding of the coarse material, by merely mixing in the hand, will surely result in decomposition of the plug, and enlargement of the cavity.

No washing can prevent such results. By reducing the compound to a fine paste, and forcing out all free mercury, the galvanic action may be greatly reduced, and amalgam rendered less objectionable. We as soon expect to find the "philosopher's stone" that would turn mercury into gold, as to discover an amalgam free from objection.

The galvanometer shows that the intensity of a current between two elements in a battery, increases as the metals approach each other, inversely as the square of the distance from one to four. In the amalgam, the elements are in the nearest possible relations. The smallest possible particle of gold and tin or amalgam, even the dust that may be taken from separating files used for those metals, shows decided action, by turning the needle. On separating the elements a short distance, no action is perceived. Thus minute surfaces excited in close proximity, equal larger ones at a distance. Again, a current, if very feeble, continued for a long time, is equivalent to an intense one for a short period.

In view of the above statement, the importance of thorough amalgamation of the compound, and cleanliness of the mouth, cannot be ignored. With these requisites, amalgams may answer a purpose for which chemistry, as yet, has failed to give anything better.

We have given our views freely and unreservedly, respecting this compound, that others, having less opportunity or inclination to experiment, may know that there are natural objections to an injudicious use of the article. Like "non-explosive" burning fluids, no matter what the vender may say, it must be used in accordance with chemical laws for security. Amalgam should be resorted to, as the physician resorts to other mercurials, to arrest a violent and threatening disease, even at the possible risk of engendering a more tardy one. A tooth that would be speedily lost without it, is a proper tooth to be preserved by it. No society or body of dentists can describe cases where and where not it ought to be used, any more than they could establish a universal fee bill. The demand for amalgam is a local matter. Its use will be determined by the skill and integrity of the dentist using it, and the intelligence and ability of the patient for whom it is used. This rule as conscientiously gives to one practice few or no such operations, to another a large percentage, and, perhaps, with as great satisfaction. It may be used for good or evil ; the only way to lessen the chances of evil, is to educate dentists in the use and recommendation of a better article for ordinary cases. Education alone can do it.

Amalgam has acknowledged merit, and many who *never* use it on paper, or in dental societies, find it at times the only thing to use in the office. Time will not allow us to describe experiments as to the distances or extent that opposite metals influence each other in the mouth.

What I have presented may not be new to you. To me, much of this knowledge is the teaching of a "still small voice," communicated through the magnetic needle—an expression of a force manifested in heat, light, motion, magnetism, electricity, chemical affinity, life—and the imagination adds, Divinity.

THE PATHOLOGY OF FEAR.

By P. H. Hayes, M.D.

To be quick to discover and appreciate the influence of the emotions and passions, whether of pleasure or of pain, upon the pathological condition of his patient, is a transcendent accomplishment for a physician. Above all, should the surgeon and the surgeon dentist be instant to see and to weigh in his mind the power of *fear* to depress the powers of life, and by so much add to the danger of a surgical operation.

It is now two years since a lady entered the office of a distinguished metropolitan dentist, to have eight teeth extracted under the influence of nitrous oxide gas. According to Dr. Colton's letter, published at that time in the *Tribune*, "She was dreadfully excited, and as much afraid of the gas as of the operation. She attempted to inhale the gas, but on each occasion when it was put to her mouth pushed it away after taking a breath or two. She finally concluded she would have her teeth drawn without the gas, and it was so done. She then fainted, fell back, and all efforts to restore life were in vain."

From this account of Dr. Colton, nothing seems plainer than that this woman died from the shock of the *operation*, superadded to the shock of *fear*. Does any surgeon believe she would have died from *fear* only, if the operation had not been performed? On the other hand, would she have died from the pain and shock of extracting eight teeth, if she had not been "terribly excited" by *fear*, as it is said, "both of the gas and the operation"? It took the two blows to kill; the one shock must follow the other. Might not this life and that of Mrs. Homans, who took ether under the spell of fear, have been saved, if the surgeon had instantly appreciated the fact that a fear-stricken patient is not, for the time being, a proper subject for anesthetics or a surgical operation? Mrs. Homans died of three blows, *fear*, the *etherization* and the *operation*, yet the record of her case is most unfairly headed, "*Death from Sulphuric Ether.*" Where two blows killed in one case, and neither alone would have done so, and three blows killed in the other, with the fair presumption that no two of them would have done so, is it fair to set the death down to one of these only?

It must be remembered that anesthetics, while they operate in the nature of shocks themselves, do no more than *abate* the shock of a surgical operation. They prevent the perception of pain, and of course the memory of pain, but the organic nervous system, which carries on digestion, respiration, circulation, nutrition, secretion, and calorification, feels the shock all the same. Notice how fear tells on the organic life: what pallor, what tremors, what suffocations, what cold extremities, how it weakens the heart's action, and redoubles its movements.

Of the direct influence of fear in inducing many morbid states which come under the physician's eye, there can be no doubt. There are, indeed, as marked differences in the moral constitutions of our patients and their impressibility to emotions, as there is in their physical constitutions, and their impressibility to physical conditions.

Of all the organs of the body which respond promptly to the

emotional life, the heart is the most sensitive. In it flesh and spirit are closest blended. The protean forms of fear, doubt, dread, suspense, anxiety, weaken its action, and, when long continued, cause dilation of its chambers, and a retarded circulation through the lungs.

Intense fear paralyses the stomach, relaxes the bowels, and is sufficient of itself to induce serious bowel diseases. The breaking out of cholera in a new locality, when the disease was epidemic, has in more than one instance been traced to the allusions and warnings contained in sermons. That peculiar and painful mental condition, known by the French as *l'imagination frappée*, was thus created by a few absurdly unwise recitals and warnings, and followed by the effects indicated above.

The legend as to the *Good Genius* of the land of Egypt illustrates the same thing in respect to the *Plague*. The *Good Genius* was going abroad for a visit, and as he went he met upon his borders the *Plague*, and held this parley with him. Said the *Good Genius*, "How many of my people are you going to destroy?" "Three thousand," said the *Plague*. "It is well," said the *Good Genius*, "three thousand is all I can spare." Time passed, the *Plague* ended his work and departed, and as he went, he met again the *Good Genius* on the border of his land, who reproached him for his broken faith, saying, "You have taken thirty thousand of my people." "Not so," said the *Plague*, "*I* took but three thousand, *Fear* took the rest."

Assalini, who treated the plague in Egypt in 1798, called it the *fever*, to get rid of "a name full of terror, and often more *mortal* than the disease itself." And again, he charged even his physicians who treated the disease with him, "if you are fond of reading, choose amusing books, not those that treat of the *Plague*."

I have talked with scores of invalids, fear-stricken by the very names of their diseases, and this they betrayed, in describing their cases, by using doctors' Latin, which they had heard applied to themselves, but of the real meaning of which they knew no more than a parrot. A patient under the tyranny of fear is already in a diseased condition, a state of things, however, which intelligence, address and coolness on the part of the surgeon may soon remove.

Absolutely pure iron is said to have been produced by a Russian chemist, by means of the galvanic battery. The pure iron is a silver-white metal, very malleable and ductile, and so soft as to be readily cut with a pair of scissors.

NEW YORK ODONTOLOGICAL SOCIETY.

"THE ESTHETICS OF DENTISTRY."

By NORMAN W. KINGSLEY, M.D.S., D.D.S.

Continued.

If a straight line, parallel to the vertical, be drawn somewhat behind the wing of the nose, and intersecting the oval below the under lip, the point of intersection is the commencement of the chin.

The length of the mouth is equal and parallel to the projection of the nose before the face.

The length of the ear is equal to that of the nose, and its place is found by its centre being in the oval (distant at the length of two noses from the facial line), therefore, by its being parallel with the nose, and equi-distant from the top of the head as the nose is with the nose.

The highest part of the head lies immediately over the top of the ear.

A line drawn from the middle of the forehead to the middle of the chin will give the inclination of the eye, the position of which is further determined by the top of the eyelid being opposite the root of the nose.

And if upon the straight line, drawn from the middle of the back of the ear to the middle of the forehead, an equilateral triangle be drawn, its vertex determines the point of the chin.

A comparison of a few leading types with this ideal profile will enable us to make a better application of the knowledge to the practice of dentistry. Figure 3 is a drawing of the head of the Apollo Belvidere, a masterpiece of Greek art, which has been accepted as a standard of male beauty for hundreds of years. The object of the artist in the representation, was evidently the portrayal of the highest type of physical, rather than intellectual beauty, and the character of this deity gave him abundant opportunity.

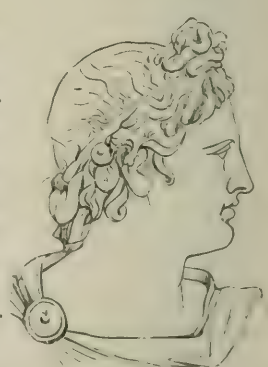


FIG. 3.

The general line of the forehead and nose is the same. In many of the Greek statues it is a single straight, or nearly straight line, from the tip of the nose to the top of the forehead, and it is this line that forms the distinctive characteristic of the Grecian profile.

But the parts to which special attention is called, are the nose, mouth, and chin. None of these features will admit of any material modification without detracting from their beauty.

Fuseli, a celebrated lecturer on art, said: "Shorten the nose of the Apollo by but the tenth of an inch, and the god is destroyed." Observe, therefore, the relation that the nose bears to the upper lip; and also the relation of the upper to the lower. The nostrils take the general direction of the mouth; were they to be raised at their posterior boundary, it would give the face a sneering and contemptuous look; or, were they drawn down, it would give a surly and morose expression.

The relative proportions of the features are substantially the same as those adopted by all artists.

The chief elements of beauty are, a short, finely curved and prominent upper lip; a full, round, but less prominent lower lip, and a strongly marked depression at the base of the lower lip, giving roundness and character to the chin.

The next illustration, Fig. 4, is that of another Grecian divinity; a head of Medusa. In many respects it is the most remarkable female head I have ever seen.

FIG. 4.

The analysis of this profile shows that it possesses the same general characteristics; and these characteristics of the lower part of the face are elements of beauty wherever found.

Thus, while at the present day the pure Greek type is very rarely seen, we nevertheless do see, in all handsome profiles, very much the same outline in the lower part of the face that has been indicated; the variations being in the upper half of the face, and not in the lower. An additional illustration is shown in Fig. 5, a drawing from life of another type of profile of not uncommon occurrence. Indeed, if I were to describe the American type, I should be as much inclined to give that name to this form of features as to any other, it being quite as universal as any other type which is distinctive, and which possesses the elements of beauty.

The proportions are much the same as in the preceding illustrations, and to a considerable extent the characteristics of beauty in the lower part of the face are the same. I present here another drawing, Fig. 6, of the same face some months after the loss of the upper and lower teeth, and here we mark the beginning of that deformity which it is our duty to remedy.

The mouth is sunken, the lips compressed, the end of the nose flattened, the nostrils drawn down, and the whole line of beauty in the lower part of the face gone.

It will be interesting to follow this development a little farther, and

Fig. 5.

Fig. 6.

Fig. 7 is another drawing of identically the same face in all the minutiæ of detail, except the region around the mouth.

Here is exhibited that wonderful transformation from youth and beauty, to age and ugliness; and all those peculiarities which were noticed in the earlier stages, are still more strikingly developed.

Fig. 7.

The last drawing shows the face shortened one quarter of an inch in the life size, and yet that very limited change throws the whole out of balance.

It is now in the power of the dentist to remodel this face, and it is important to carefully consider whether any greater improvement can be made than simply restoring the features to their original form and position. I think the more it is studied, the more certain will be the conclusion that the original form in this case harmonizes better with the upper features than any change it is possible to make.

I experimented upon the patient from whom these illustrations are taken, and found that any material variation from the original form showed a want of correspondence between the lower half of the face and the upper.

In contrast with this last, let us examine one of the ugly developments of nature, and one in which, when the change that we have been considering takes place, and which we call deformity, we find is really a step toward comeliness.

This face, Fig. 8, will be readily recognized as a type of many, and one which, at first glance, seems to have hardly a redeeming feature; and yet, when analyzed, it is only the lower half of the face that is decidedly ugly. It is only the cartilaginous and movable part of the nose, together with the two lips, which give this beastly look. The forehead is not bad, neither is the chin. It is worth considering what can be attempted here for improvement. To make a mouth like the mouth of the Apollo would be impossible. Such a mouth, in conjunction with other features, which we cannot alter, would only be making a deformity of a beautiful individual member.

Fig. 8.

Fig. 9.

But there is no danger of committing such an error; the features can only be manipulated to a limited extent. But we can depress the lower end of the nose, raise the nostrils, retract and shorten the lips, and shorten and improve the face by raising and advancing the chin.

Instead of attempting, in a case like this, where all the teeth have been lost, and the alveolar processes absorbed, to restore the features to their original position, as we would in a former illustration, we should study to avoid that, and at the same time study to avoid the appearance of a sunken mouth.

Fig. 9 will show such a result.

It is the same face as in Fig. 8, but with the chin raised one quarter an inch. The advantage gained is decided; in the former case the same process produced deformity.

But we do not always get improvements by the absorption of processes, and the retreating of lips.

It is not uncommon to find the upper lip less prominent than the lower, and that, too, when the teeth are fully developed underneath. In such a case it is manifestly desirable, if the free movement of the muscles of the upper lip will permit, to advance it to the line of beauty.

The movements of the mouth must also be carefully studied, for it is possible to produce a most desirable change to be observed when the mouth is in repose, but when seen in action, the expression from overstrained and unduly taxed muscles is disagreeable. In modeling, therefore, great respect must be paid to expression, for a pleasing expression is of far more consequence than a scientifically beautiful outline or contour.

This leads very naturally to the steps to be followed subsequent to the establishment of the profile.

The extraction of the canine teeth, with their long roots, destroys the expression of the face more than that of any other teeth.

The roots of these teeth support the wings of the nose, and when extracted, allow that feature to be disagreeably drawn down, together with the formation of a deep wrinkle immediately behind it. The wax model will require in many cases to be well carried up at this point, or this feature will not be restored. But avoid making the crowns of the canine teeth too prominent. These crowns lie under the corners of the mouth, and there is hardly anything more disagreeable than to see the corners of the mouth strained when in repose, or revealing, when opened, two tiger-like fangs. Be careful also not to strain the upper lip so that its beautifully curved line is obliterated, and the mouth present only a straight incision.

Preserve also the groove which should indicate the median line below the nasal septum, which is also a mark of beauty. With the lower lip, also, use the utmost care that only its edge be advanced, and that it be entirely undisturbed at its junction with the chin ; and if possible, at the corner of the mouth let the lower lip fall within the upper. And lastly, consider the support and consequent form which will be given to the cheeks. If all the processes which have already been indicated have been skillfully performed, this last will be comparatively easy of accomplishment. With all the other features in harmony, and only sunken cheeks to fill out to correspond, the labor will be light. But here, too, there is danger of exaggeration. It is not difficult to build out to an excess, and suggest a swollen face or a morsel of something foreign in the mouth.

In the restoration of the features after the teeth have been for a long time removed, the cheeks and the lips not having been supported meantime by art, both the comfort of the patient and the necessity of preserving the identity would suggest that the entire restoration be not accomplished at once. In like manner, when the features are to be remodeled, and the muscles taxed beyond their original development, the change can be made gradually with ease, and without sacrifice of expression. The muscles must be allowed freedom of action, and it will sometimes be quite difficult to permit this, and at the same time give the most desirable form. It will be borne in mind, however, that the muscles can be developed into a use which is not common with them, and certain expectations for the future may be predicated on this fact.

A striking illustration of the extent to which a displacement of the muscles and consequent building out of the cheek can be carried, is shown in the *Dental Cosmos*, June, 1874, in the report of a case where the side of the face from the orbit to the lower jaw was lifted from its natural resting place to the extent of three-quarters of an inch.

The foregoing remarks upon the remodeling of the features and restoration of expression must be regarded as only suggestive. Definite rules cannot be given ; the art can only be acquired by observation and experience.

* "This branch of esthetics must, of necessity, be worked out by every one for himself. He will succeed or fail just in proportion as he has the ability to observe the hundreds of models which are perpetually before him ; and as he has the further and rarer ability to apply his observation to the special cases that are in his laboratory.

Imitation of nature is the rule. Limitations of art, and individual capacity, make the exact observance of this rule comparatively rare. We replace the sixteen teeth with only fourteen, and often make them shorter and every way smaller than the natural organs. We do not make the grinding surfaces interlock with such deep cusps as in nature. At one time we cannot avoid an unnatural fullness of artificial gum ; at other times, the contraction of the absorbed arch compels the setting of molar teeth nearer the median line than the original teeth.

Notwithstanding these and many other disadvantages, the perfection of the dento-ceramic art is such, that a skilled artist, who is quick to observe what nature requires, can, in the majority of cases falling under his care, supply the lost dental organs with great accuracy, and pre-

* Prof. Austin.

serve that higher order of beauty which grows out of the harmony of his work with the expression of the face and entire person.

But no dentist can give to his work this kind of beauty, who does not systematically study the natural organs as they daily present themselves in the operating chair.

Few patients would object to the pressure of a roll of wax (two inches long and about a half inch thick) against the closed teeth. A model from this impression would give the size, form, arrangement and articulation of all except the molar teeth. A well matched porcelain tooth (more than one might be required) would add to these data the color of teeth and gum. To this add also the age, sex, physical characteristics of the face, and the physical temperament. If the dentist would have a case and books for the registration of one such carefully made observation every week, he would, at the end of two years, have a collection which, as a practical guide in the selection and arrangement of artificial teeth, would prove of incalculable value. These fixed records of minute details are made still more useful by a habit of close observation in society.

In this way a set style or mannerism may be avoided, which so often stamps dental work with meaningless uniformity of expression."

In all these efforts the law of harmony must not be forgotten. A skinny forehead, angular eyebrows, hollow eyes and depressed temples, associated with full lips, plump cheeks and a well developed chin, will strike even an ordinary observer as an incongruity. In the study of human faces, the student of nature will find new and pleasing wonders continually; and to carry out the law of harmony, his highest powers of discrimination will be in constant requisition. He will find, to his astonishment, that what might be termed mechanical symmetry is lacking in every face.

So accustomed do we become to the general configuration of the human head, that we rarely if ever view it critically. A close comparison of one side with the other of almost any face will detect grave departures from uniformity.

A straight line from the centre of the forehead to the centre of the chin will not necessarily bisect the nose, showing that the median line is not a straight line, but a curve.

Neither the eyes nor the eyebrows will occupy the same angle to the median line; one side will be higher than the other, and the same is true of the mouth.

The distance from the corner of the mouth to the outward corner of the eye will not measure the same on both sides.

The horizontal circumference of the skull being ovoid, the face does not occupy the precise front, it being longer from the anterior median line to the posterior median line on one side than the other.

By standing behind a person and looking over the head, thus bringing the face reversed to the eye, these deviations from mechanical perfection may be more readily noticed. By such observation we may learn that a slight variation in the fullness of the cheeks will harmonize better with the surrounding features of that side than if both were equally plump.

In making an artificial denture, the next step which demands esthetic culture after taking the bite, is the selection and arrangement of the teeth.

The making of artificial teeth is purely the performance of a sculptor. To produce the original model, when the market is to be supplied with duplicates, calls into exercise the same talents.

To *copy* carefully the various forms of teeth as they are presented is art, only in a limited sense.

To carve an imitation of a natural denture, not a copy of any specific presentation, which will possess, in each individual tooth, a character in harmony with the whole number, and with the face ; to so arrange the whole as to assist in the very best expression of the surrounding features, and, in addition, to give them the color and tone of nature, is an artistic accomplishment in the highest sense.

Copying is simply a mechanical achievement ; in all larger objects the perfection of the duplicate can be ascertained by measurement : machines are now made to duplicate almost any irregular form that is required. In smaller objects, a correct eye to detect variations takes the place of instruments.

A copy admits of no ideal embellishment.

In making a copy the mind is a slave ; but in creating an imitation the mind works with a freedom from all restraint. The true artist therefore rises above a mere copyist, and brings forth his *imitation*—which is in fact a new creation, and not the copy absolutely of anything. In the production of artificial teeth to supply the market, but little art is required. The exercise of good judgment in the selection of natural organs to be duplicated in form and color, does not call into use the highest artistic talent. Artificial teeth, when made by manufacturers, should be in appearance, so far as they will be exposed in service, strictly copies from nature. We say *copies ;* because the manufacturer cannot by any possibility take cognizance of the peculiarities of the individual for whom they will be used. He cannot, therefore, indulge in

an imitation, and benefit the dentist so much as by strictly duplicating nature, in a full variety, and leave to the dentist to hide as far as possible the individual incongruities by an artistic arrangement. It is somewhat surprising that the manufacturers have produced such admirable imitations of nature as are now often found in the market when the demand for their productions has come from a class of men who were, to a considerable extent, devoid of esthetic culture. Taking the profession as a whole, the manufacturers have probably in this respect been the educators, rather than the followers.

This is evidently reversing the natural order of things. Manufacturers are but commercial men actuated by the love of gain, governed by the laws of trade—demand and supply—and it is a shameful comment upon a profession of the pretensions of dentistry, that a trade which cares only to supply what is demanded, should have the credit of teaching a profession its own wants.

Manufacturers make what will sell, and it is not to be wondered at that the market is filled with inferior productions, so long as there is a sale for them.

But it is to be wondered at, that a profession which is brought into daily contact with the natural teeth, and should be distinguished for its good taste, are such partial observers as not to detect the inferiority.

This lack of cultivation is evidenced in other ways besides the one referred to. In a majority of the publications where engravings of the teeth are used as illustrations—the forms are positively ugly; and it is not the fault of the engraver—he follows copy closely; even to the imperfections. In the illustrations of the correction of irregular dentures, the models furnished the engraver, while conveying some notion of the change which has occurred, show in a majority of instances a disregard of the form of the teeth which would otherwise make the illustration much more effective. It is easy to see in many cases that the impression from which the model was made, was taken in wax, and all the defects made by the draft of the wax in the removal, are shown in the model; left untouched, and carefully copied by the engraver. This lack of appreciation of the beautiful, graceful and true, lies clearly with him who furnishes the model.

The beneficial influences upon the mind of having it fully impressed with an ideal standard, are not inconsiderable.

It becomes a great help in the determination of any type to be used or adapted to any given case.

With the mind thoroughly conversant with any given standard of excellence, it becomes very easy by the laws of the association of ideas, to

make or select teeth with such deviations from it as may be desirable. It will be remembered that the most pleasing forms in nature are those with the softest and most graceful outlines—hard and angular forms do not give pleasure, except by contrast.

In the development of the natural teeth the laws of harmony as universal in uninterrupted nature are beautifully illustrated. In the youth from twelve years old and upward, the features of the face present their most charming appearance ; all the lines are soft and rounded ; sharpness and angularity come on with maturity and old age.

The teeth obey the same law. In youth, immediately after their full eruption, they present their most perfect appearance ; their cutting edges and grinding surfaces are beautifully modeled ; but as age advances the abrasion from the antagonizing teeth, together with the almost imperceptible friction of one against another in the same row, continually act so as to modify this form.

Thus, in taking the extremes we find the perfection of full development in the youth, changed to a mere stump, without beauty in old age.

To describe all the types that are found in nature, and which may be in perfect harmony with the surrounding features, would be impossible. It would be assumption to give any one as possessing all excellence, but as in art there may be a standard or ideal, accepted by a majority of cultivated people, so we may present a type which shall combine the beauties of many, and from which deviations may be made as circumstances require.

Figures 1, 2, 3, 4 and 5, show the front view of two canines, a central and lateral incisor, and a bicuspid.

They are drawn larger than nature to render their peculiarities more forcible.

1 2 3 4 5 6 7 8

It will be seen that neither in their outlines nor any portion of their surface, are there straight lines or angles ; every portion of the surface presents that easy and graceful contour an artist loves to dwell upon.

The outlines of the incisors, which are less undulating than those of any other, are still far from square or angular.

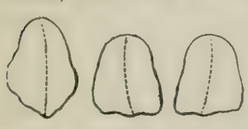
Each side is unlike any other side, and the cutting edge, which be-

comes square from abrasion as age advances, is, when fully developed, curved and wavy ; and this line, fuller in the centre and depressed each side, is continued up the face of the tooth, forming a gentle ridge perpendicularly along its surface.

The narrower and rounder parts of the tooth will also be observed ; the changes from the flatter portions coming not by regular inclination, but at a point about two-thirds the length of the crown from the cutting edge, the outline dips by a graceful sweep into a depression, which is common to all well formed teeth.

This line of beauty is very often neglected in artificial teeth, when arranged in a denture with the shape as given by the mould the spaces between them have the appearance of being made with a separating file ; so perfectly uniform are they.

All the teeth anterior to the molars have a ridge more or less perceptible running perpendicularly along the face of the tooth—this is sometimes very faint in the incisors, but is shown very bold and in striking contrast in the canines. In the incisors and bicuspids it always assumes a curve with an inclination toward the median line ; but with the canines, this order is reversed, and the ridge curves the other way, thus :



The central and lateral incisors, as any ordinary observer will have noticed, are very much the same in their general contour ; the principal difference being, that the laterals are not quite as wide in proportion to their length, and are about one-third narrower than the centrals.

In figures 2 and 5 are represented two types of canines. Figure 2 harmonizes better with the incisor shown here, than does figure 5.

Figure 5 would be more appropriately classed with longer and slimmer associates.

The characteristics of canine teeth are equally developed in both. The same graceful lines of beauty that marked the incisors are here also seen—the same depression on the sides of the upper third : the chief difference being that the canines at that point are rounder and bolder than the incisors ; but below the upper third the difference is radical. The central ridge is very prominent and terminates in a cusp, and the wavy line of the cutting edge of the incisors is duplicated, one on each side of the cusp, thus :

The posterior approximal surface is distinguished by a symmetrically formed tubercle, more or less defined; but most certainly, a mark of beauty. This tubercle is better delineated in figure 7, which is a profile view of figure 2. In figure 5, this tubercle, with its corre-

sponding prominence on the anterior approximal surface, is developed higher up on the tooth ; which constitutes the main difference in the two types. In figures 1 and 8 we have a pure type of a bicuspid ; the resemblance to the canine being easily seen ; the same bold surface, cusp, undulated outline and posterior tubercle ; the chief deviation in the external appearance being in a pretty well defined tubercle on the anterior approximal surface, and a relative reduction in size.

The characteristics of these three classes of teeth, viz.: incisors, canines and bicuspids, are not confined to their front view.

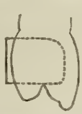
Their profiles are equally peculiar, as shown in figures 6, 7 and 8. The central face of the incisor shows a regular curve ; the canine has no less than three different planes or curves ; the boundary between the upper third, and that below, being marked by a decided prominence, while at the corresponding point on the bicuspid the profile is flat and the main fullness is below. The peculiarities thus pointed out, are all that concern the appearance of artificial teeth.

The second bicuspid does not differ materially from the first, except that in nature it is generally smaller, and the molars are placed so far back as not to call for any especial criticism upon their appearance.

In passing we desire to call attention to a point that is almost always overlooked by the mere mechanical dentist.

The profile of the lingual surface is almost invariably *curved*, very *rarely* straight.

These teeth are oftener used to pass a clasp around than any other, and in a majority of instances the clasp at that point is made *flat ;* and of course fits the teeth very inadequately.

 or thus. 

The trouble arises from a supposition that the model is perfect, whereas if the impression is taken in wax, the model is sure to be faulty, and it is very often the case even with plaster impressions ; and again, a lack of observation as to the real form, so that the model may be trimmed if defective.

(*To be continued.*)

It is stated in the Cincinnati *Gazette* that Mr. S. A. Bell, of Plainfield, Ohio, has found under an ancient mound a quantity of fragments of bones of very young children, with the tooth of a rodent animal, which had been used as a neck ornament. These relics were discovered in a large bed of coal and ashes, indicating that the fire had covered a space of twenty-five feet in diameter.

BURRING ENGINES AND THEIR USES.

By B. U. R. R.

That Dentistry in some form has been known for hundreds of years, is shown by the writings of Ovid and Horace, historians whose works antedate the Christian Era. They mention certain forms of Dentistry, and even record a knowledge of treating diseased and decayed teeth by filling the cavities with gold and other substances. The more natural expedient of extracting in some way the offending tooth must have long preceded this. But more modern records show that Dentistry, as a distinct profession, has been followed but little longer than a century. In this comparatively short period the profession has progressed with giant strides, and improvements have succeeded one to the other with a rapidity that has secured for it recognition as a special branch of surgery. The past ten years have been proportionately more fruitful of improvement than any preceding decade. The dentist of 1860, if awakened from a Rip Van Winkle slumber, would be as much amazed at the labor-saving devices and improvements he would find in a modern dental office, as would John Greenwood, who opened the first dental office in America, in New York, in the year 1788. Of the auxiliaries to this progress, the Burring Engine has played one of the most important parts, and the conservative reluctance of the profession to accept innovations did not long stand in the way of this improvement. Although this conservatism found expression in unnumbered objections and prophecies of the danger, to tooth and nerve, from the rapid revolution of the burr, the machine has pushed its way to a place among the necessities of dental apparatus. This is partly owing to, and partly a cause of, the encouragement of late given to anything conducive to the welfare of practitioner or patient. The manufacturers who established dental depots and repositories have contributed to the development of this and other improvements.

The disadvantages of the hand system of excavating, the difficulties in the way of speed and thoroughness, and the laborious exertion, are as familiar to the reader as the hand instrument used, which no one has yet had time to forget, however unpleasant the remembrance.

In this primitive method, the Green Pneumatic Burring Engine, the first device introduced, and the first to be treated of in this paper, found an occupant of the field that could scarcely be called a competitor for public favor. This pioneer engine was a curiosity in its way, with

sufficient of merit to find its way into many offices, in some of which it is still used, with improvements that have been added from time to time. The following description will show its points of excellence and faults, as it first appeared.

The power was applied to a bellows, which, in its place on the floor, was worked by the foot, and from its tendency to impart a swaying motion to the body of the operator, rendered an assistant almost a necessity. A section of rubber tubing connected the bellows with the metal hand-piece containing the mechanism, and the suction of air through a chamber set in motion two loaded fans accurately set, and fitting closely together. This motion was communicated to an encased shaft by means of cog-wheels, and into this swiftly revolving shaft the cutting tool was tightly screwed. This method of holding the burr was found to be an objectionable feature, as the burr was continually working loose and dropping out. The bellows being a suction one, the air could only be drawn into the chamber, and the revolution was always in the same direction, while many think that an easy change of the motion adds to the effectiveness of the machine.

When the proper motion had been secured, and the operator had accustomed himself to the rather heavy hand piece, the machine was ready for work, and work it would, with greatly increased results over the hand method, but with an annoying accompaniment of monotonous humming caused by the rushing volume of air. This noisy, whirling vortex, had also an unpleasant fondness for light and loose substances, which it swallowed voraciously, making no exception in favor of hair or whiskers, from which it sometimes levied a contribution. adding much to the effect by its startling abruptness.

These slight drawbacks, even in their combined inconvenience, did not overbalance the gain in the single matter of time, and when the increased thoroughness of the work and the relief of tedium to both operator and patient was added, there was no hesitation in deciding in favor of the new method. These machines were somewhat expensive. costing from $75.00 to $100.00 in the beginning, and a continual outlay to keep them in repair.

The Morrison Engine followed the Green very closely, scarcely giving the first time to become very generally known.

It consists of a lathe driving wheel from the frame of which rises a straight rod supporting an arm or shaft, to which the hand piece holding the cutting tools is joined by an ingenious flexible connection. Universal joints give this arm motion with equal facility in every di-

rection, a belt from the driving wheel to a fixed pulley on the shaft imparts to it a rapid revolution. The connection between the shaft and the movable part of the hand piece is a spiral spring, which, by its elasticity, holds them firmly together, and yet admits of their ready separation. By twisting the spring to the left it is enlarged, so that the smooth ends of the arm and hand piece may be inserted or extracted with ease, while any strain, without the twisting motion, serves to increase the strength of the hold. Despite the apparent simplicity of this operation, a novice would waste a great deal of time in performing it. Instances are known of cases in which, after a desperate struggle, lasting two hours, and the exercise of persuasive profanity, the desired result was still as far from accomplishment as ever.

With this machine several methods of holding the tool are identified: combinations of slots and springs accomplish in a measure the desired result, although none are perfectly satisfactory. An ingenious contrivance of a right angle or back action attachment adds, in some cases, to the effectiveness of the work.

The Elliot Suspension Engine, which next appeared, was considered by many to be a great improvement over its predecessors, and it at once took its place in many offices, where its claim to superiority has as yet been disputed by no invention of later date. This engine, by a simple and effective application of one of the most simple mechanical movements, attains the desired object with an absence of complexity, which adds greatly to its usefulness. The practical dentist will fully appreciate this quality, knowing, as he must, the value of simplicity of construction in all the apparatus of the operating room and laboratory.

The distinguishing excellence of this engine is its easy adaptability to cut in any direction, without the necessity of carrying about the base or changing the direction of a hampering arm. In short, what may be termed a versatility of motion on the part of the hand piece, gives the device a greater range of usefulness, and effects a saving of time and trouble to the operator.

This engine, like the Morrison, derives the motive power from a driving wheel propelled by a treadle. The motion of the wheel is conveyed by a belt directly to a pulley on the end of the movable shaft in the hand piece. The cord runs over a balance pulley, suspended from the ceiling, allowing the hand piece to be raised or lowered, and always keeping the band tight. The hand piece hangs in a horizontal position, being balanced by an iron ball just under the revolving wheel. The hand piece, though somewhat heavy, is not unwieldy, as the balance

pulley from which it it suspended counterpoises its weight. The hand piece is the simplest and most serviceable one in use, consisting merely of an encased shaft, to which the burr is affixed and held by a spur and slot. This method of attaching the cutting instrument is the best yet introduced. Into the revolving shaft of the hand piece a hole is drilled deep enough to hold two thirds the length of the burr, and through one side of this hole a spur projects about a sixteenth of an inch. This spur fits into a transverse slot cut in the burr, and holds it against any pulling strain. A longitudinal slot leads to the transverse one, and admits of the insertion of the burr as the spur is fixed. A small spring directly opposite the spur presses the burr against it, and holds it to a steady motion.

With the above description of the varieties of Burring Engines the reader can trace its rapid improvement and note the excellence attained in its construction. But the possession of an engine is not the only requisite to good and rapid work, and even the manner of keeping the burrs has an importance that it will not do to overlook.

A description of the burr is unnecessary, as the shapes and styles are familiar to every one. The practice of keeping the burrs loose in a box, or on a stand, is a source of annoyance and inconvenience, as the whole stock must be picked over in selecting any particular shape.

The following hints, if followed, will obviate the necessity of any waste of time in making a selection :

A burr holder which will be found to answer the purpose admirably, may be made as follows : Take a block of some light colored wood, against which, as a background, the shape of the burr will be distinctly defined.

A block about eight inches long by two or four inches wide is large enough to give room for a sufficient variety. The thickness should be about two-thirds the length of a burr. Bore entirely through this block, four rows of twelve holes each, and on the bottom fasten a thin piece of wood, thus getting a uniform depth to the holes. Range the instruments in the rows, classified according to size and shape. Fill each hole so that a vacancy will exist only when a burr is in the machine. When a change is desired, drop the one last used into its place, which is as easy as dropping it on the stand, and select the one next wanted. In this way the arrangement will be undisturbed, and in a few days use a knowledge of the place to look for each burr will be acquired.

With this systematic arrangement of burrs, and with a proper care of

the engine, better results will be obtained. That the bearings of the engine should be well oiled is an obvious requisite. The larger bearings should be oiled every day, and thoroughly cleaned at least once a month, and the hand piece should be taken apart every day, the old oil wiped off, and new put on. Many good operators, while appreciating the value of the machine, and using it to great advantage, do not as fully utilize it as might be done. In the laboratory, too, its usefulness is not always appreciated.

In repairing rubber plates it is very handy to drill the holes in the old rubber for undercuts to attach the new rubber to. Also in finishing gold plates, a finishing burr in the machine more readily reaches some portions than the files and larger burrs of the laboratory. The operator using an engine at the chair, should be careful to put the rubber over teeth enough to keep it out of the way of the burr. Then to prepare the cavity, he should excavate with the proper sized burr, being careful not to bring the cutting instrument in direct contact with the enamel from the outside, as this dulls it very rapidly. Many dentists forget that when necessary to cut the enamel, if they cut from the inside they will inflict less pain, make better progress, and avoid a rapid dulling of the instrument. When cutting out a seam, there is danger of the burr catching in it and splitting the tooth. A good method is to start the seam with a Johnston fissure-drill, beginning at the front and working back, keeping the drill well buried, to prevent its catching. It is also advisable not to use the burr so constantly as to heat it, as this unnecessarily pains the patient, and injures the burr by softening it. This may be avoided by frequently reducing the pressure for an instant. The question of temper in the burr is very important; if tempered highly, although the cutting edges may be broken, the rough edges which remain will cut nearly as well. If the burr be soft it will wear smooth, and be rendered useless. When the tooth is filled and the filling ready to be finished, the machine is again needed. A variety of finishing burrs, which accompany the engine, are very well adapted to the purpose, but are open to the objection of clogging with gold between the teeth. When they become filled in this manner, they cut very slowly, acting more as a burnisher, heating very quickly, and causing pain to the patient. This can be remedied by having the assistant keep the burr wet with a syringe, thus keeping it cool and free from chips. The assistant can keep it wet, and at the same time run the lathe, and in this way a great deal of time will be saved.

A better contrivance for finishing fillings is the corundum wheel, which is not so well known. Many different shapes are in use, and so-called sets are made. The most serviceable shape is the wheel, which, in different sizes, will be found to fit cavities of all shapes. The corundum disc has a distinct field of usefulness. The sets mentioned above consist of a variety of peculiar shapes, but the peculiarities soon wear away, leaving the wheel shape before described. In finishing with a burr, it is necessary to cut toward the edge of the filling, or the burr is liable to drag the gold away from the wall of the cavity, but with the corundum wheel the cut is so clean that this is unnecessary.

The corundum discs have a greater diameter than the finishing wheel, and are much thinner. They are used principally in separating teeth and cutting down approximal fillings. They are very well adapted to this purpose, as they cut rapidly and polish as they cut, so that the work has not to be gone over for the second time with a polishing wheel. Extreme caution must be observed in their use, as they cut the flesh or cheek at the slightest touch, and quicker than the sharpest knife. A necessity to the successful use of these discs, is that they be set true on the mandrel, otherwise they will run with an unsteady motion, which renders them very liable to breakage, and prevents their effective use. Some little skill is required to put them on correctly, but this is repaid in the single item of saving the loss by breakage, as they are quite expensive. A good plan is to slightly warm the mandrel, being careful not to heat it sufficiently to warp the disc. Place the disc on the mandrel, which is in the machine, as accurately as possible, and then, with a straight-edged stick in the left hand, run the machine while holding the hand piece at an angle from the stick, until the disc touches the stick at every point in a revolution. Plunge the mandrel into cold water and the disc will be set so as to give satisfaction. Both varieties of the corundum wheel should be kept wet when in use, to prevent a rapid heating. This will also make them last longer and cut better, as when dry they gum over and do not cut.

For polishing fillings and teeth, there are several contrivances. The turned wood polishing points are excellent for the purpose, and are used in a cup mandrel designed for them. A thin turned boxwood wheel, offered by the Johnston Bros., is also useful. Both are valuable for removing the strips of green tartar from the necks of teeth, which a hand polishing stick could reach and remove with difficulty.

In places between the teeth which cannot be reached by the wooden wheels, the leather disc is used to advantage. It is made by cutting

out a round piece of leather, which is shaved from the centre, which is thick enough to hold the screw of the mandrel to the edges, which are left as thin as they can be cut. This will penetrate into very small crevices, and impart a polish which cannot be gained as easily in any other manner. With all these forms of points, pumice is used.

The services of an assistant are of course necessary in a well regulated dental office, and this necessity is increased rather than diminished by the Burring Engine, for the exertion put forth in running an engine is disastrous to delicate manipulation of the rapidly cutting burr. With an assistant of muscular ability, and a careful cogitation over, and self-elaboration of the information hinted at in these pages, a Burring Engine can be made a source of perennial satisfaction.

B. U. R. R.

OXYGEN GAS AS A REMEDY IN DISEASE.

From New York Medical Journal.

By Andrew H. Smith, M.D.,

Member of the Academy of Natural Sciences, Philadelphia; Corresponding Member of the Gesellschaft fur Heilkunde, Berlin; late Assistant Surgeon and Brevet Major U. S. Army, etc.

CHAPTER V—CONTINUED.

Dyspepsia.—In this disease oxygen has succeeded when all other means failed. Its most unqualified commendation is by Trosseau, whose knowledge of the resources of therapeutics has rarely, if ever, been surpassed. He speaks of having by its means in several instances "*recalled to life* women regarded as lost," from great depression of the digestive powers consequent upon puerperal hemorrhage or excessive lactation. He cites, as an example, the case of a girl twenty-two years of age recently delivered and exhausted with nursing. Her features were "absolutely those of a *cadaver.*" She was admitted into the hospital April 1, 1864. The treatment began by weaning the child, but for fourteen days there was no improvement. She had continuous fever, pulse 120 to 130, skin hot and dry, and constantly increasing debility. The debility became so great that she could not sit up in bed without fainting, and auscultation was rendered almost impossible. It was ascertained, however, that there were no tubercles. Tonics and iron were tried, but failed completely; the anorexia remained absolute. On the 14th of April she began inhaling oxygen; very little was given her

the first three days; the first attempt to inhale caused syncope. Still by the 19th she was able to sit up in bed with ease and to eat a little. Pulse 104. The 19th, she sat up for an hour and asked for food. Pulse 92, skin cool. The 24th, the pulse fell to 80; the patient went down into the garden, described her appetite as *voracious*. April 30th, the pulse was 72 to 80, and had been so for the last four days. The patient desired to leave the hospital. But she was still pale, "the living fibre having regained its tonicity sooner than the blood its normal constitution."—*Clinique Médicale de l'Hôtel Dieu*, tome iii., page 64.

Demarquay also relates similar cases in which the oxygen gave very prompt and decided relief.

Birch insists strongly on the power of oxygen to remove congestions of the liver, and to relieve the dyspeptic symptoms consequent upon them. He cites a number of cases which sustain his views.

With regard to the possible effect of oxygen upon chronic disease of the liver, an observation of Hanfield Jones is very significant. In an article on the "Function and Diseases of the Liver," he says: "The oily contents of the hepatic cells are subject to great variation, both in individuals and in different classes of animals; the less perfect the type of the respiratory process, the greater the quantity of oily matter in the hepatic cells."* This statement suggests the inquiry how far fatty liver may be owing to defective hæmatosis. May it not be that the confinement which produces the *foie gras* so delicious to the epicure acts by preventing the reception of a due proportion of oxygen into the blood. Surely the "type of the respiratory process" under such conditions must be anything but perfect. In the human subject, sedentary habits or improper alimentation may act to diminish the capacity of the blood to carry oxygen, and thus a condition of the respiratory process be produced approximating to the type of those classes of animals in which the hepatic cells are normally loaded with fat. Accepting this hypothesis, the systematic use of oxygen ought to be beneficial in such cases.

Diabetes.—Several cases are recorded in which inhalations of oxygen have caused a temporary disappearance of the sugar in the urina of diabetes, and with it relief from the general symptoms of the disease. Dr. Pinkney, of New York, informs me that he has met with two such cases. Peroxide of hydrogen has been given with the expectation that the second atom of oxygen would be liberated in the system, and result in the more perfect combustion of the sugar. Dr. Richardson has

*Braith., January, 1853.

recently employed it in eleven cases, and gives it as his opinion that it is of no value.—*Medical Times and Gazette*, December 12, 1868.

Mr. Byfield, on the contrary, reports (*British Medical Journal*, October 17, 1868,) a case *cured* (?) in ten weeks.

Demarquay, referring to the effect upon diabetes of a residence in the dense atmosphere of the sea-shore, attributes it to the greater quantity of oxygen inhaled, and adds :

"In support of these facts I may cite the results which I have obtained with inhalations of oxygen in the case of several diabetics, without changing their regimen in the least. I have seen the quantity of sugar in the urine diminish in a notable manner. The figure may descend in a few days to one-half of that usually observed, at the same time that the strength is seen to revive. M. Bérenger-Férand, a very distinguished young naval surgeon, as also Dr. Yvan, who have both applied, at my instance, inhalations of oxygen to the treatment of diabetes, have modified advantageously the condition of their patients. Without doubt, we have only acted upon the symptoms of the disease ; but, in the present state of science, what other treatment can we apply to diabetes, since science has not determined either the nature or the real cause of the disease ?" *

An observation of Bouchardat is very significant in this connection. It is to the effect that an excess of sugar may exist in the blood without glycosuria, but the moment the respiratory function is interfered with, as for instance by a bronchitis, sugar appears in the urine.—*Revere des Cours Scientif.*, Jan. 2, 1869.

Albuminuria.—In some cases of this disease the albumen in the urine may greatly diminish, or, for a time, disappear entirely under the use of oxygen. I have seen two cases of this kind. The amendment, however was but temporary. M. Const. Paul reports a similar case.—*Half-Yearly Compendium*, January, 1869.

The frequent occurrence of albuminuria, in pneumonia and other diseases or conditions involving the respiratory function, is a suggestive circumstance in this connection.

Rheumatism and Gout.—But little is known as yet of the effect of oxygen in these diseases. Dr. Golden (*Lancet*, March 10, 1866), observing that the lithic-acid diathesis appeared more decided in cases in which respiration was imperfectly performed, was led to try the effect of oxygen in gout. The result was very satisfactory. Since then Koll-

* Essai de Pneumatologie Medicale, p. 709.

mann, an apothecary of Munich, has experimented as to the effect of the inhalation of oxygen upon the quantity of uric acid excreted. He found that it produced an immediate diminution, and that, after continuing it a few days, the uric acid entirely disappeared from the urine. The treatment certainly deserves a trial in these diseases.

Uræmia.—I have not been able to find an instance recorded in which oxygen has been employed in this disease, but it appears to me to offer a chance of benefit. If, as I suspect from experiments already detailed, oxygen has the effect of diminishing the quantity of urea formed, it certainly should be useful in this affection.*

Neuralgia.—Dr. J. Hooper was entirely successful in a case of obstinate neuralgia which had resisted a great variety of treatment.—*Brit. Med. Jour.*, March 15th, 1862.

La Passe (*Essai sur la Conservation de la Vie*) states that he cured himself of "*atroces migraines*," by frequent inhalations of oxygen.

Hill cites one case, neuralgic pain in face, which had resisted every form of treatment, and which yielded promptly to oxygen.

Demarquay.—Case of "*migraine*," complicated with neuralgic pains recurring in daily paroxysms, entirely cured by oxygen.

Birch.—Case of "nervo-congestive headache," of long standing, perfectly cured; another case in a lawyer, from overwork of the brain, relieved while taking the first inhalation. A third, connected with uterine derangement, and occurring periodically, entirely cured.

Dr. Mackey, Professor of Materia Medica and Therapeutics, Queen's College, Birmingham.—Three cases of headache, one from chlorosis, one from bilious attacks, and one from depression from over-use of brain and from mental anxiety—all permanently relieved, the headache ceasing each time *during the inhalation* of the gas.—(*Practitioner*, May, 1869.) These are three out of ten cases of various diseases relieved by oxygen. He considers that these ten cases had this in common, that there was venous congestion in some organ or other. Speaking of neuralgia in general, Demarquay says: "The blood is the regulator of the nervous system. According to this idea, it would be right to endeavor to allay

* Since the above was written, Dr. Howard Pinkney has kindly furnished me the notes of a case of uræmia following scarlatina, in a child nine years of age, which was successfully treated with oxygen. There was paralysis on one side of the body, coincident with convulsions on the other. The attack had lasted three hours, and the face was dusky and the lips blue. After the inhalation of five gallons of oxygen, the color improved, and by the time eight gallons had been taken the lips had a natural vermilion hue, and the paralysis and convulsions had ceased. There was no return, and the patient made a good recovery.

certain troubles of the nervous system by introducing into the blood a greater quantity of oxygen. In fact, modifying the conditions of the blood ought naturally to induce a change in the essential character (*manière d'être*) of the nervous system, central or peripheric."

Paralysis.—Beddoes cites two cases cured, one relieved, and one not benefited.

Birch describes a case of complete paraplegia, of "several" years' standing, entirely cured by two years' persistent use of oxygen.

In relation to paralysis, Demarquay observes: "We have seen, in the study of the physiological action of oxygen, that the muscles fix in some sort more especially this agent. . . . It is certain that the inhalation of oxygen excites in some persons a necessity for muscular activity. This indication on the one hand, and the anatomical fact which we have cited on the other, prove the powerful effect of oxygen upon muscular action. The fact of paralysis cured under the influence of oxygen comes also to the support of this view."

Epilepsy.—Beddoes claims to have cured one case, while in five other cases he was entirely unsuccessful.

Birch adds to his almost miraculous cures two of epilepsy, one case being of thirty years' standing.

Dr. Ramskill (*Medical Times and Gazette*, July, 1863), reports a case of epilepsy in a young man, aged twenty-three, resulting from syphilis. The attacks occurred every fourteen or sixteen days. He inhaled oxygen two or three times a day, stopping the inhalation only when a feeling of dizziness came on. At the end of three months he had had only one attack, which was slight. The cachectic aspect which he previously had had disappeared. Two years after, he saw him in perfect health. He had had no attack for sixteen months.

Dr. Wallihan (*Chicago Medical Journal*, March 1st, 1869), in a case of epilepsy, which had existed for some years, and in which the paroxysms were of frequent occurrence, employed a mixture of oxygen and nitrous oxide with the effect of reducing the frequency of the attacks, until, at the time of writing, three months had elapsed without a recurrence.

Fatty Placenta.—Assuming the correctness of the views upon which Prof. Simpson bases the treatment of such cases with chlorate of potash, we should have in oxygen a more direct and powerful remedy than any heretofore employed. Once prove that the fœtus perishes from a deficient supply of oxygen through the maternal blood, conse-

quent upon a diseased placenta, and the indication is as plain as in croup or asthma.*

Irregularities of Menstruation.—Beddoes and Birch both cite cases in which irregularities of the menstrual function were corrected by the use of oxygen. The first case described by Birch is one in which the return of each menstrual period was attended by a most excruciating headache, beginning two days before the period, and continuing two days after its cessation. During all this time the patient was obliged to remain in bed, in a darkened room. This state of things had continued for a number of years, and had resisted every possible form of treatment. The use of oxygen for a short time produced a perfect cure.

In another case, along with various uterine symptoms, there was fullness and weight about the neck and about the base of the brain, and impairment of nearly all the special senses, and also partial paralysis of one side of the tongue. The patient was at the menopause. A few inhalations of oxygen produced a great improvement in the sight and hearing, and a course of six weeks completed the cure.

(*To be continued.*)

CARVACROL.

By E. A. Bogue, M.D., New York.

This substance, when first introduced to the profession, was of such a disagreeable odor, and so unpleasant to handle, that it was almost impossible to use it. It is now, however, thanks to the efforts of Dr. Sage, being furnished in an almost unobjectionable form ; and as it has one or two qualities certainly, that commend it to use, it will be well to notice any new ones, as they may be discovered. One of these qualities, which was, I think, first noticed by Dr. A. L. Northrop, is its property of dissolving gutta percha ; especially when the latter is warmed. Hence if Carvacrol has been put into a sensitive cavity, a thin layer of gutta percha, or Hill's stopping, may be spread evenly over the bottom, without drying the cavity out ; thus making use of the solvent property of the Carvacrol, while it is doing its work, in allaying

*I have recently received a letter from Messrs. Geo. Barth & Co., of London, engaged in supplying oxygen for medicinal purposes, from which the following is an extract : "We know of a case of defective placenta and consequent repeated abortions, where the daily inhalation of oxygen—4 pints to 24 of air—for three or four months was attended by the best results ; the patient being subsequently delivered of a healthy child."—[Second Ed.]

sensitiveness; or, the cavity may be completely filled, and the burnisher moistened with the surplus Carvacrol, will finish the filling much more smoothly than usual, if finished in the ordinary way. For the insertion of root fillings, in cases where gutta percha is desirable, and for a great deal of the patching that requires to be done, where pivot teeth have been worn for a good many years, and where oxy. chlo. zinc is not admissable, Carvacrol proves a very valuable adjunct.

CORROSION OF TIN.

Tin is generally regarded as the least liable to change of all our common metals; but a case, recently reported to the American Academy of Arts and Sciences by Mr. S. R. Sharples, State Assayer of Massachusetts, cites a circumstance which appears to be wholly contradictory to such theory. A tank, belonging to an hotel in Collinsville, Conn., was lined with block tin containing less than 2 per cent. of impurities. Some time after the construction of the receptacle, white deposits were noticed upon the lining, and the owners, fearing that the water might be rendered deleterious, sent specimens of the powder and of the water to Mr. Sharples for analysis. The white powder proved to be oxide of tin with a mere trace of iron, and the water, which was led to the tank through 100 feet of lead pipe, was entirely free from the latter metal.

During the month of March last, an interval of nearly two years having elapsed since the above examination, and the tank lining being some five years old, the proprietors called Mr. Sharples' attention to the fact that the lining had become perfectly riddled by corrosion, and this although there had been a free and constant circulation of fresh water, an analysis of which showed even better results than before. There were 4.20 parts of inorganic matter and 0.80 parts of organic matter in 100,000, and no nitrates were present.

This extensive corrosion can hardly be accounted for, as the weight of present authority points strongly to the unalterability of tin under similar circumstances.

NOTES.

Erratum.

No. 7, page 246, in remarks of Dr. Francis, for "buckle" read buccal—a provoking mistake, for which neither Dr. Francis nor the Secretary of the Odontological Society are responsible.

Dr. T. B. Hitchcock.

We copy, from Massachusetts papers, the following notices of the death and burial of Prof. T. B. Hitchcock, by whose demise dentistry in our country has lost one of its most scientific and zealous students.

We hope that hereafter we may be able to give to our readers a more complete record of the life and labors of our scholarly friend, from the pen of one of his co-laborers.—[Ed.

Dr. Thomas B. Hitchcock.—The death of Dr. Thomas B. Hitchcock will touch with sorrow many hearts in our community. Just in the prime of a useful and honorable manhood, it has seemed good to the Great Giver of all, to call him back to Himself. After graduation at the Harvard Medical School in 1860, he adopted dentistry as his specialty, and in that direction was working with his native energy when the war called him to the assumption of more arduous duties and greater responsibility. He was appointed Assistant Surgeon of the 42d Regiment of Massachusetts Volunteers, under Colonel Burrell. The loss of his superior officer left him to perform the duties of the position, which he continued to do until mustered out of service. Upon his return he at once resumed the practice of dentistry, and in 1868 was appointed Professor of Pathology and Therapeutics in the Dental School of Harvard University, which position he filled so well, devoting all the energies of his nature to the faithful performance of every duty, and the acquirement of every new advance in knowledge, so thoroughly imbuing himself with his subject, that it will be difficult to fill his place. On the resignation of Dr. Keep, he was appointed Dean of the school, and entered upon his new duties with an eager ardor which has identified him with the cause of dental education, to which he has fallen a martyr. Faithful and conscientious in the performance of every duty, earnest for the honor and advancement of the profession to which he has devoted himself, he has won the love of those who were associated with him in his work, and the affectionate regard of many who employed his professional services.—*Boston Globe.*

The Funeral of Dr. Thomas B. Hitchcock took place at the residence of his father, Hon. David K. Hitchcock, Centre street, Newton, last Saturday afternoon. There was a large attendance of friends and former professional associates, including President Eliot of Harvard, Members of the Faculty of the College, Dr. Oliver Wendell Holmes, and others.—*Newton Journal.*

Annual Meeting of the Minnesota State Dental Association.

The Minnesota State Dental Association convened at 10 o'clock, at Theopold's Hall, in the town of Faribault, on Wednesday and Thursday. Dr. Bowman, of Minneapolis, in the chair. The attend-

ance of gentlemen from all parts of the State was pretty well, considering the intense heat of the weather.

After the admission of several new members, signing of the Constitution and By-Laws was through with, the regular order of exercises was at once entered upon, and several hours of both the morning and evening session of both Wednesday and Thursday were consumed in listening to the addresses and essays. The essays most prominent among the number read were those by Doctors C. E. Miller, of Rochester; Hurd, of Faribault; De Montreville, of St. Paul; and Williamson, of Red Wing.

They enchained the attention of the audience by the originality therein presented, showing that we have a body of special investigators in our midst, that, in their specialty, are eminently practical and very utilitarian in their views.

Among other questions discussed was the subject of special legislation to regulate the practice of the profession in our State, which, however, was finally passed over and laid on the table till the next annual meeting, so that full time might be given to hear the workings of legislation in the States of Pennsylvania, Ohio, New York and other States which have found laws necessary as a protection for the public to guard them against the malpractice of charlatans and quacks, that through the tempting bait of cheap work so successfully delude the public.

The choice of the Association for officers for the coming year was unanimously in favor of Dr. De Montreville, of St. Paul, as President; Dr. Williamson, of Red Wing, Vice-President; Dr. J. H. Bryant, of St. Paul, Secretary; and the present incumbent, Dr S. A. Beecher, of St. Paul, Treasurer. After the regular calendar of business was gone through with, the Association adjourned to the office of Dr. Hurd, of Faribault, when cliniques were held, at which Dr. Griswold, of Minneapolis, (a late acquisition in our State) presided, assisted by Dr. J. G. Harper, and by whom the manipulation of Barnum's dam—Varney's pluggers—heavy *vs.* light mallets, was fully discussed, commented upon and shown to the members of the Association, as well as to others present.

The South Carolina State Dental Association.

This Association held its annual session in the city of Charleston on the 16th, 17th, 18th and 19th of June. The meeting was the most successful and interesting of any held since its organization, and in point of representation the most numerous, and resolutions were offered to have the proceedings published as soon as they could be compiled for the purpose.

A bill was framed to be presented to the next session of the Legistature of the State, to regulate the practice of dentistry in South Carolina.

Many interesting papers were read and discussed, and some new ideas eliminated.

The following officers were elected to serve during the ensuing year:

THOS. F. CHUPIN, Charleston, S. C., President.

G. F. S. WRIGHT, Pomaria, S. C., First Vice-President.

M. BISSUL, Camden, S. C., Second Vice-President.

C. C. PATRICK, Charleston, S. C., Corresponding Secretary.

J. W. NORWOOD, Greenville, S. C., Recording Secretary.

T. W. BONCHIER, Cheraw, S. C., Treasurer.

J. W. NORWOOD,
Recording Secretary.

THE

Morrison Dental Chair.

Price, $150.00. Boxing, $5.00. Spittoon Attachment, $8.00.

It possesses great superiority over any chair before offered to the profession, and is at the same time less expensive than any other first-class chair. Some of its points of superiority we here enumerate :

1st. All the advantages of any low-based chair, and also of any high-based chair, are here secured in a single chair. In it the patient can be placed lower than in the lowest-based chair made, or higher than in any other of which we have knowledge. At its lowest position the seat is fifteen inches, and at its highest position forty-two inches above the floor.

2d. The operator using the Morrison Chair can either stand or sit at his work, as he may choose, working with equal convenience in either position.

3d. It has been a very general complaint that dental chairs are too wide at the back, so holding the operator away from his work. Here this difficulty is overcome. The chair is narrow at the back, so that the operator need not stretch to reach the patient, but *can lower either arm of the chair out of the way* and so be as near the patient as he may choose.

4th. It can be changed from its lowest to its highest position in seven seconds—a celerity impossible in any chair raised by a screw.

5th. It can be very readily and perfectly adapted to operations on children of any age

First. Because in it the child can be raised as high as needed for the tallest operator.

Second. It provides a comfortable back and head rest, exactly as for grown persons.

Third. The footstool can be lengthened or shortened, to suit children of any size.

6th. The back of the chair can be lengthened or shortened rapidly and at will.

7th. The lower part of the back can be thrown forward to support the small of the patient's back.

8th. The chair, when adjusted to any position, is firm or steady wherever placed, and this is *especially true of the head-rest.*

9th. It occupies less room than any other operating chair.

10th. Although the footstool, when at its extreme length, is much longer than any other made, yet a person of ordinary weight can stand on its extremity without tipping the chair.

Nota Bene.—We have substituted brass cogs and castings, for those that experience has shown in any degree faulty, and the chair, *as now sold, is as strong as any chair made.* Reference is made to this because several of the chairs first sent out, failed in the cogs by which the chair is raised, and in the castings which throw the lower back-pad forward. These have been replaced in every instance with brass cogs, without charge on our part, and to the complete satisfaction of the purchaser.

We are gratified in being able to refer to the commendations, which follow, from some of the leading practitioners of the country.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

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10 W. 11*th St., New York, July* 24*th,* 1873.

MESSRS. JOHNSTON BROS., Broadway :

I find your Morrison Chair gives great satisfaction. My patients all admire, and voluntarily pronounce it the easiest they ever sat in. The movable back-piece, arms and foot-rest, which latter the patients can adjust at pleasure without changing their position, the lowering of the whole chair, which admits stepping into it without the slightest inconvenience, are points which call forth immediate praise from the patients, and give great satisfaction to the operator.

As a child's chair it is invaluable ; the little patients can be "put just where you want them," while the operator can with ease change the position of the *whole* chair, without disturbing the patient in the least. These points, combined with others which it has, make this chair the most desirable of any which I have seen. Very respectfully yours, A. L. NORTHROP.

JOHNSTON BROS., *Hartford, June,* 15*th,* 1873.

GENTLEMEN : I have used the new Morrison Chair several hours every day since its arrival here, and feel in duty bound to say that there is no chair manufactured that can compare with it.

Its adaptability to children as well as adults, support for the small of the back—in fact, all its motions are perfect, and I see no chance for improvement. Dr. Morrison and yourselves have my heartfelt thanks for the great benefits you have conferred upon the profession in perfecting the chair as well as the Dental Engine. Very truly yours, GEO. L. PARMELE, M.D., D.M.D.

MESSRS. JOHNSTON BROS., *Hartford, July* 24*th,* 1873.

DEAR SIRS : The Morrison Chair meets all my expectations. I like it very much ; in fact, I feel perfectly satisfied that I have one of the most complete chairs yet made for the comfort of patients and the convenience of the operator.

Yours truly, JAS. McMANUS.

JOHNSTON BROS. *Bloomington, Illinois, July 18th, 1873.*

I am well pleased with the Chair. Think it equal to anything that has ever come before the profession. Success to the inventor and manufacturer.

J. CAMPBELL.

MESSRS. JOHNSTON BROS., *Bennington, Vt., July 7th*, 1873.

GENTLEMEN: The Morrison Chair is the best I have ever used, and the most comfortable for patient or operator.

Yours truly, J. N. SCRANTON.

MESSRS. JOHNSTON BROS. *New York City, July* 25th, 1873.

GENTLEMEN: I deem it a pleasure to add my testimony as to the merits of the Morrison Chair. How can the intelligent dentist afford to be without it? Some of its merits are: The many comfortable positions in which the operator can place himself while operating, especially the low sitting posture; also the rapidity of movement and quick adjustment of the essential positions of the Chair, and a very comfortable seat for the patient during an operation. The Chair itself is a beauty; thanks to the *inventor* and *manufacturer*, we now have a trinity in the dental world; *the Liquid Gas, the Morrison Engine, and the Morrison Chair.*

Respectfully, C. BURNSIDE STODDARD.

MESSRS. JOHNSTON BROS. 28 *East* 13*th St., New York, July* 24*th*, 1873.

GENTLEMEN: In reply to your request for the opinion I have of the Morrison Chair, after a few weeks' use, I can say, first of all, that it is the easiest Chair to work over I have ever used; and not only for the operator, but also for the patient. The adjustment of the parts, after a little familiarity, is most rapidly accomplished to suit almost any whim of either doctor or patient. There is a facility in bringing yourself and your patient into harmonious working relations, which can be understood only in its use. It is not necessary to speak in detail of its parts, which are familiar to all—only of the foot-rest, which seems most intractable of all, I have found perfectly convenient for all classes of patients. Wishing you success commensurate with your merits,

I am very truly yours, W. A. BRONSON, M. D.

MESSRS. JOHNSTON BROS. *Norwalk, Connecticut, July 24th*, 1873.

DEAR SIRS: In reply to your note of yesterday I would state that one thousand dollars would be no inducement for me to part with the Morrison Chair if I could not replace it. My patients are unaminous in their praises of the Chair, and all wish that they had one at home. I know of no greater praise or recommendation than that, that could be bestowed on any chair.

Yours in haste, THEO. E. SWIFT.

MESSRS. JOHNSTON BROS. *Lee, Mass., July 26th*, 1873.

DEAR SIRS: I am using the Morrison Chair, and find that it meets every requirement for comfort to myself and patients. It gives me pleasure to say that I consider it a perfect Chair. It has been regarded with uniform admiration by all who have examined it.

Very truly yours, H. H. FITCH.

MESSRS. JOHNSTON BROS. *Hartford, July 25th*, 1873.

DEAR SIRS: The "Morrison Chair" I consider the best, most convenient, and in all respects the easiest to adjust for dental operations, of any I ever used.

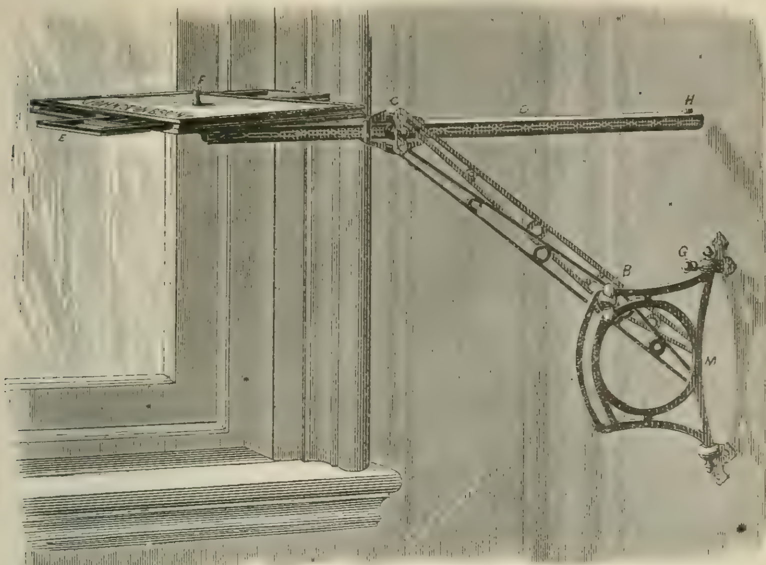
Yours truly, JOHN CODY.

MESSRS. JOHNSTON BROS. *Wooster, Ohio, April 24th*, 1874.

GENTS: I received your Chair, and am *well* pleased. Have used it for one month and cannot find an imperfection in it. So far as my experience has led me, there is not a requirement of an Operating Chair that it does not possess. I would not exchange it for any chair now manufactured.

Yours with respect, C. B. MOWER.

MORRISON DENTAL BRACKET.



Price, $25.00. Boxing, $1.00.

The cut represents the table in its highest position, and distant from the wall a little more than half the distance it is capable of taking. By loosening the thumb-screw B, and allowing it to rest in the bottom of the slot, (instead of at the top as represented here,) the table will occupy a position as much below M as it now does above the same point. The extreme range, that is, the distance between the table when at its highest and its lowest position, is 24 inches.

M represents a metal frame which is secured to the wall or other support by screws. It swings from side to side as a gate on its hinges. C. M. represent light but strong metallic arms, hinged at M as a centre and moving up or down. At B is a thumb-screw passing through a slot in the frame M. By it the arms can be firmly clamped at any desired height.

At C is a slide-rest through which the hollow rod D passes freely, and may be clamped at any distance from its ends. At one end of this bar a square table is supported, having in it foil and instrument drawers. This table is capable of rotation round F, which is the burner of an alcohol lamp, the alcohol being contained in D and introduced at its further extremity H. Among the advantages of this bracket are these:

1st. It combines a greater variety of range and movement than any other.
2d. It is rigid in whatever position it is clamped, and will hold 15 lbs. with steadiness.
3d. It provides a clean receptacle for foil and instruments.
4th. It is obvious that a square table is very much more convenient as an instrument stand than a round one.
5th. Its drawers extend through the table and can be opened from either side.
6th. To those having a Morrison Chair it is almost indispensable, as it will follow the chair to either its lowest or its highest position.

It is handsomely ornamented and nickel-plated throughout, so that it is a very beautiful addition to the furniture of the operating room.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

REMODELED
Morrison Dental Engine.

NEW YORK, May 25, 1874.

JOHNSTON BROTHERS.

GENTLEMEN:—You ask my opinion of the Remodeled Engine:

I have now used mine two weeks, and would say that its advantages to the operator over the old style are nearly as obvious as were those of the first Engine over hand work. JOHN T. METCALF.

The cut on the following page well illustrates the new Engine, and, with the subjoined description, will make the alterations plain to all.

DESCRIPTION.

1st. The rocking movement of the upright standard is abandoned, and a rigid, handsomely plated, and tapering column substituted.

2d. From the top of this column extends an arm directly in front of the patient. This arm swivels upon the column, and is adjustable vertically, being secured by a brace at any height desired, thus bringing its end directly in front of the patient's mouth, whatever be the height of the operating chair.

3d. Attached to the end of the adjustable arm by a most ingenious universal joint, is a shaft about twelve inches long (corresponding to the extension arm of the old engine), which carries at its end the handpiece.

a. This shaft, being short, is much lighter than the old one, enabling the operator more perfectly to feel his work, and is also less liable to tremor.

b. Both sides of the mouth may be reached without changing the position of the engine.

c. By lowering or raising the adjustable arm, according as the operation is upon the superior or inferior teeth, the driving spring is but slightly flexed, and great steadiness secured.

4th. The off-centre spring is attached above the driving wheel, partially supporting it and reducing the friction.

5th. The handpiece is much smaller, and the burs so secured that they may revolve in either direction, and at the same time be used either with a pushing or pulling cut, and this without the use of a catch spring. Old style burs can be refitted to this handpiece.

The model engine of this pattern, as above described, has been for several weeks in use in the hands of one of the best operators in our city, and is pronounced by him a very decided improvement.

JOHNSTON BROS.

REMODELED MORRISON ENGINE.

Price, $60. Right Angle Attachment, $5. Boxing, $2.

JOHNSTON BROTHERS,

Dental Depot,

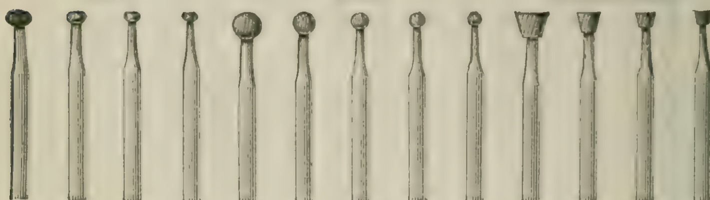
812 BROADWAY, NEW YORK.

Equipment for Morrison's Dental Engine.

PLUG FINISHING BURS.

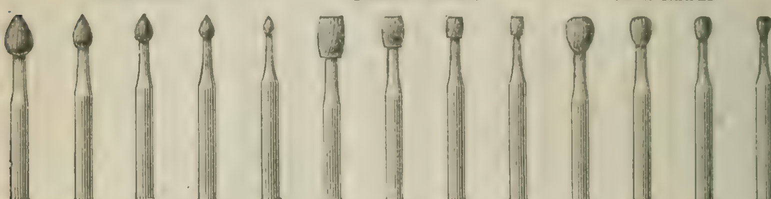
1

OVAL. ROUND. INVERTED CONE.



2 3 4 5 6 7 8 9 10 11 12 13 14

BUD SHAPED. BARREL SHAPED. PEAR SHAPED.



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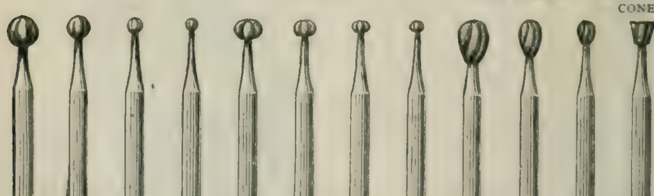
BURNISHERS.

ROUND. OVAL. PEAR SHAPED. INVERTED CONE.



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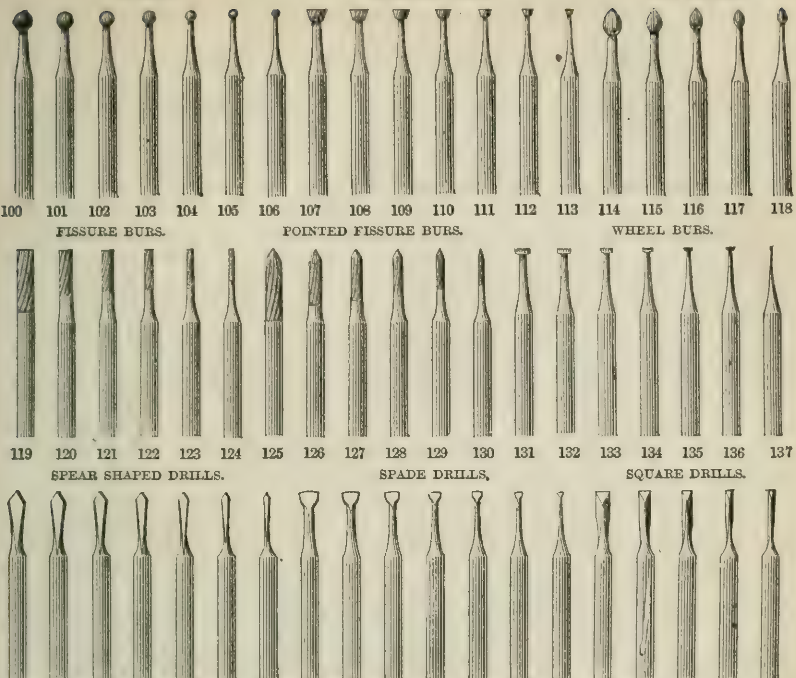
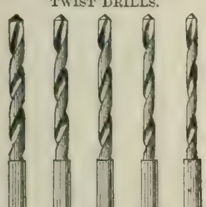
CORUNDUM POINTS FOR MORRISON ENGINE.

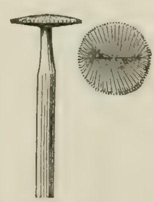
FORMS BY Dr. A. L. NORTHROP.

75 76 77 78 79 80 81

CAVITY INSTRUMENTS.






Price, $1.25.

CAVITY INSTRUMENTS FOR RIGHT ANGLE ATTACHMENT.

We have in stock, and can furnish *Cavity Instruments* for the *Right Angle Attachment*, of all styles and sizes, from Nos. 100 to 218, inclusive.

SCOTCH STONES, MOUNTED.

The Scotch Stones enable the operator to give a finish to fillings hitherto unattainable, and only need a trial to be appreciated. We have these in stock of forms Nos. 75, 77, 80 and round. Other kinds of stones are now in process of manufacture.

HINDOOSTAN STONES, MOUNTED.

Forms of Nos. 75, 77, 80, and round. Of each shape we make three sizes. The cuts referred to by the numbers represent the large size. These are, beyond doubt, of the greatest utility in cutting either gold or bone. They last longer than any other stone.

LEATHERS, MOUNTED.

We have in stock Leather Points mounted on Mandrils, of forms Nos. 75, 77, 80 and round, designed to be charged with powders, for polishing and finishing fillings.

Screw Mandril, to be armed with leather, wood, etc., for polishing fillings, cleaning teeth, finishing plates, etc.

PRICES.

Finishing Burs,	Per dozen,	$6 00
Stoned Finishing Burs,	Each,	1 00
Cavity Instruments and Screw Mandril,	Per dozen,	3 00
Stoned Cavity Burs,	Each,	50
Right Angle Cavity Instruments,	Per dozen,	3 00
Leathers, Mounted,	"	3 00
Hindoostan Stones, Mounted,	"	6 00
Scotch Stones, Mounted,	"	3 60
Burnishers,	"	9 00
"	Each,	0 75
Corundum Points, Mounted,	Per dozen,	1 50
" " not Mounted,	"	0 75
Bands for Engine,	"	1 50
Twist Drills	Each,	40

IN ORDERING INSTRUMENTS, DESIGNATE THEM BY THEIR NUMBERS, AND STATE WHETHER THEY ARE WANTED TO FIT THE (A,) (B,) OR (C) HAND-PIECE.

Hand Piece, Style A. 

Hand Piece, Style B. 

Hand Piece, Style C. 

We can alter A or B burs to style C, at 25 cents per dozen.

When sending burs by merchandise mail for alteration or repair, attach your *card* or *printed address* to the outside of the package—do not write it. Send at same time a letter containing your count of the burs, and directing the disposition you wish made of them.

☞ Our instruments are all made of the best Stubs' steel. We shall spare no effort to make them equal in every respect to anything offered to the profession.

☞ We are constantly adding new forms and sizes of Plug Finishing Burs, Cavity Instruments, Drills, etc.

DIRECTIONS FOR USING THE ENGINE.

1. In lifting the engine, be sure *not to bend* the arm which carries the hand piece.

2. Whenever the least noise is heard, oil the engine with the best sperm oil. The rapidity of motion renders oil a necessity.

3. The only part at all likely to break, is the small spring, which conveys power at the upper end of the hand piece. It is not soldered to the shaft, but is slipped on by hand. To put on a new spring, take hold of it near the end opposite that you apply to the shaft, and twist as if to *uncoil* the spring, at the same time pushing the spring on to the shaft. You will be greatly aided in removing the broken parts, by twisting, as if to uncoil, the spring. A piece of emory paper will be found convenient to aid in holding the polished shaft.

4. The engine, to run satisfactorily, should be oiled daily ; and the driving-spring

IMPROVED INSTRUMENTS.

We have added to our list three new and very popular sizes of Cavity Burs. One round called 106½, one inverted cone called 113½, one wheel-shaped called 137½. Each is smaller than any before made by us, of its shape. These numbers are neatly put up in dozen and half dozen packages, and are completely protected from oxidation and from rubbing against each other in transportation.

They are very popular, and we frequently receive orders from dentists for from one to three dozen of each.

STONED BURS FOR BURRING ENGINES.—For some time past, we have made to order, a Bur for use in Burring Engines, by the following process : The teeth of the Bur being laid out with extreme accuracy, are filed to *exactly the same length,* but are not brought to a cutting edge. The Bur is now tempered, and each tooth *afterwards stoned to a fine edge.* This secures a Bur perfect in all its cutting edges, and unequaled by anything hitherto offered in the market. Of these we are provided with a limited supply, of both Cavity and Finishing Burs, excepting Fissure *Burs.* (See Price List.)

Thin Boxwood Discs for carrying Polishing Powder, to polish fillings in proximal cavities. These are of four sizes, from ⅝ inch to 1 inch diameter.

We add that the Instrument-stand, elsewhere illustrated, will be found very useful for the convenient keeping of the Engine Instruments while not in actual use.

Besides the form represented in the cut, we have them with smaller holes, and very many more of them, so that each Bur may be kept by itself.

We invite the fullest examination of our Engine Instruments, as regards

The quality of the steel from which they are made.

The shape and finish of the cutting edge.

Their temper.

The rapidity with which they cut.

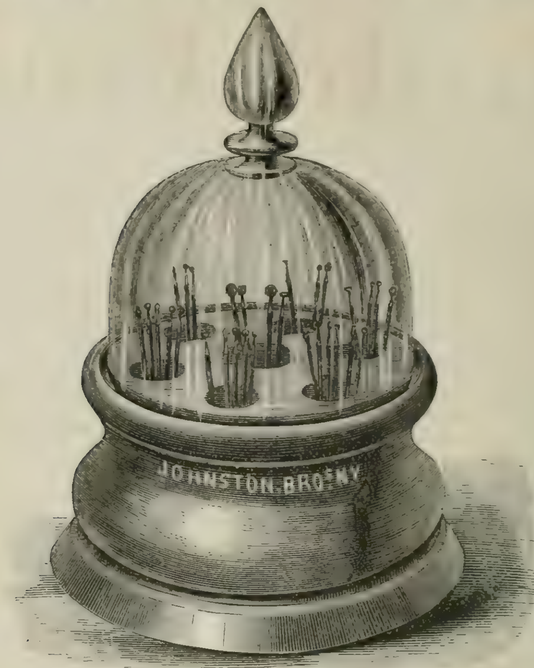
Their durability.

The shaft of each instrument is *round and highly finished*, and can therefore be used without unreasonable and unnecessary injury to the nose of the hand-piece, which injury occasions unsteadiness in all the uses of the Engine.

They will *bear* examination in *quality* and *price*.

JOHNSTON BROS.

INSTRUMENT STAND FOR ENGINE BURS.



Price, $2.50.

No. 1 as above. No. 2 with many more, but smaller holes.

This is made of rosewood and maple in alternate layers, and is very ornamental. Besides the form shown above, we have another like this in all respects except that the holes into which the burs are placed are made so small as to hold only one or two instruments in each. We call this No. 2.

JOHNSTON BROS.

CARVACROL. $C.^{20}$ $H.^{14}$ $O.^{2}$

HIGHLY RECOMMENDED.

PROPERTIES:—Locally applied, Carvacrol, in full strength or diluted, seems to possess antiseptic, disinfectant, sedative, mildly caustic and escharotic, gently styptic, stimulant, irritant and rubefacient properties.

Carvacrol, as a substitute for Glycerole of Thymol and Creosote or Carbolic Acid, in cases of Odontalgia, Sensitive Dentine, Alveolar Abscess, "Canker Patches," etc., may be locally employed in the same manner.

As a gargle for Tonsillitis and inflamed mucous membranes, it may be employed in the proportion of about three drops to the ounce of water, or the strength can be increased when more powerful action is required.

Price per Bottle, $1.00.

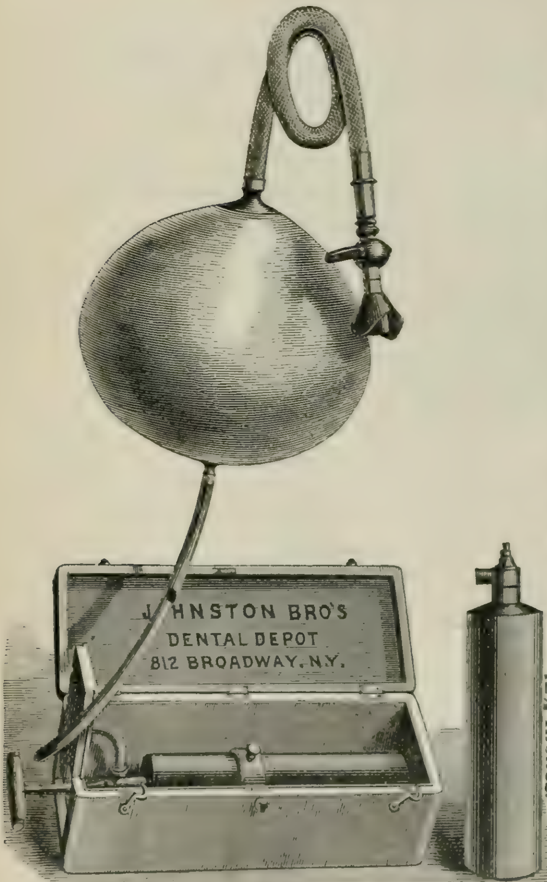
H. L. SAGE, D.D.S.

For Sale by JOHNSTON BROS.

LIQUID NITROUS OXIDE.

[Revised Circular.]

The increased and still increasing demand for Pure Liquid Nitrous Oxide, and for information concerning apparatus for its exhibition, renders it necessary that we issue yet another edition of our circular upon that subject As the Surgeon's Case, as first introduced, has proved itself in every way all that we could wish it to be for the place assigned to it, we cannot do better than to repeat here our first description of it.



SURGEON'S CASE.

This comprises a strong cylinder containing One Hundred Gallons of Gas; a strong morocco covered case, provided with an iron ring and set screw, by which the iron cylinder is held in place during use, and its delicate valve protected from injury; also, a rubber bag with rubber tube at one end for admission of gas, while an inhaling tube, handsomely covered on its outside, and provided against any possibility of a collapse by a tin-coated spiral of wire on its inside, is fastened at its opposite end—an inhaler—a nickel-plated wrench and a nickel-plated key. In fact, *all* the apparatus necessary for administering the gas. The whole case and contents weighs about fifteen pounds. This is here shown as open, and the bag which receives the gas from the cylinder, and from which it is exhibited to the patient, is represented as filled, and suspended above the case. The cylinder is also shown as standing at the side of the case. This is the simplest and most popular form of apparatus, and will be everywhere welcomed —because of its portability for use outside of the operating room.

REVISED PRICES.

Complete Apparatus — Surgeon's Case, with Metallic Inhaler. . . . . **No. 1.**	$42 00
Complete Apparatus—Surgeon's Case, with extra sized Bag and Metallic Inhaler. . . . . **No. 2.**	45 00

Boxing either, $1.00.

Each complete apparatus includes a 100 gallon cylinder, filled with Liquid Nitrous Oxide.

Cylinder with 100 gallons of Gas.	16 00
Refilling Cylinder.	6 00
Morocco covered case, with ring and thumb screw, velvet lined,	12 00
Polished bl'k walnut " " " " "	13 00

Of these latter we have only a limited number.

Rubber Bag, with covered inhaler tubing, (about 4 gall. capacity)	5 00
Rubber Bag, with covered inhaler tubing, extra size.	7 00
Inhaler, with spring valves, trumpet mouth-piece, with Plated connection.	8 50
Inhaler, latest style, with two way stop cock, adapted to the use of both dentists and surgeons, with connection.	9 50
Key, Nickel Plated.	1 50
Wrench, "	50
Union, Nickel Plated, (nut and tube), for connecting cylinder and gas bag.	1 50
Covered Inhaler Tubing, per foot.	50
Plated Connection to fit old style Inhaler.	1 00

REMARKS.

When the side of a bag has been perforated, it cannot be repaired, but should be replaced. Send on the tubing by mail, and the bag will be replaced. Price. 3 00

As this cannot be done *properly* except by the use of rubber cement and by persons experienced in the business, we think it every way advisable that it be entrusted to the rubber workers, and not attempted by the dentist.

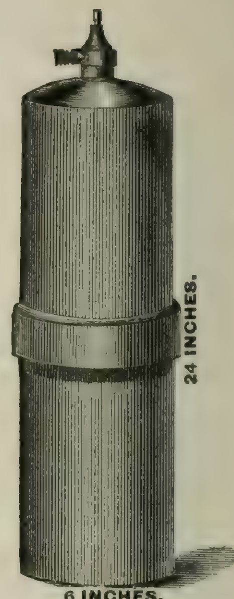
JOHNSTON BROS.,

812 BROADWAY, N. Y.

ONE THOUSAND (1000) GALLONS GAS.

LIQUID NITROUS OXIDE.

1000 GALLON CYLINDER CASE.
Price, $30.00. Boxing, $2.00.



1000 GALLON
CYLINDER.
Price, $36.00.
Boxing, $1.50.

Gas in 1000 gallon lots, 4½ cents per gallon.

The above illustrated apparatus is especially desirable where large quantities of nitrous oxide are used, or where it must be sent a great distance. In this form it is best to ship it by *fast freight*—which makes the cost of transportation very light.

THE GAS CAN BE KEPT FOR ANY LENGTH OF TIME,

AND IS

CONSTANTLY ON HAND AND ALWAYS OF THE BEST QUALITY

PRICE LIST OF A COMPLETE OUTFIT.

1 Black Walnut Paneled Case, octagonal	$30 00
2 1000 gallon Cylinders at $36 00	72 00
2000 gallons of Gas at 4½ cents per gallon, being 25 per cent. less than price in small cylinders	90 00
1 Bag, with covered Inhaler Tubing	5 00
1 Bag, extra size, with covered Inhaler Tubing	7 00
1 Key, Nickel Plated	1 50
1 Wrench, Nickel Plated	50
1 Union, " "	1 50
1 Inhaler—Metallic—with two way stop cock and connection	9 50
	$217 00
Deduct Gas	90 00
Cost of Apparatus	$127 00

By purchasing under this plan a saving of 25 per cent. is effected in the cost of the gas, or on 2,000 gallons of $30.00.

It is right that we should here announce that we have in hand a piece of furniture, which—while it will answer the purpose of the black walnut case illustrated—will also serve as a stand for an ornamental Gasometer.

A cut of it will appear in an early issue of the DENTAL MISCELLANY.

As these large cylinders can easily be sent by fast freight (*the* 100 *gallon size is too small to be so risked*) cost of transportation is reduced to its lowest rate.

JOHNSTON BROTHERS,

812 Broadway, New York.

PORCELAIN TEETH.

Our stock is carefully selected from the factories of the BEST MAKERS, and embraces all of the varieties in use, including Continuous Gum Teeth. We will fill orders on short notice for any manufacture of teeth.

Dentists sending us their orders can rely on receiving prompt attention, and on getting manufacturers' best rates.

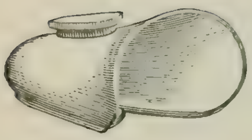
JOHNSTON BROTHERS.

DENTAL GUM—RED.

Johnston Bros.' Nos. 1 and 2, per lb	$2 50
E. Dougherty's Nos. 1 and 2, per lb	2 75
American Hard Rubber Company's, per lb	2 50
Whalebone Rubber, per lb	3 50
Dental Gum—black—per lb	3 00
Gutta Percha, per lb	3 00

JOHNSTON BROTHERS.

OSBORN'S TONGUE HOLDER.



Osborn's Tongue Holder and Duct Compressor. Is Cleanly, and Reflects Light in the Mouth.

This is by far the best Tongue Holder and Duct Compressor ever offered to the profession. The cut exhibits one adjusted as when in the mouth, also a view of one in use.

It possesses the following advantages, in addition to those of other apparatus designed for the same purpose.

1st. It covers the tongue, and so completely protects it from accident, while at the same time permitting to the patient some chance for changing its position *inside of the cup.*

2d. The cup which covers the tongue being of the finest white porcelain, *reflects light in the mouth*, and so *greatly* aids the operator.

3d. The cups can be readily and perfectly washed, and the use of the apparatus is therefore far less objectionable to the patient than is that of the ordinary metallic tongue holder.

4th. This apparatus is so readily applied that it is often used when the application of rubber dam would be difficult, or require considerable time. The cup pressing upon a pledget of spunk or bibulous paper nicely placed upon the ducts effectually prevents the flow of saliva.

It is recommended by Drs. William H. Allen, W. C., Bennett, and Frank Abbott, of New York city, and C. Fones, of Bridgeport, Conn.

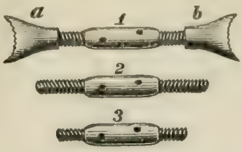
PRICES.

Complete, with three porcelain cups	$10 00
Sets of three cups	4 00
Single cups	1 50

JOHNSTON BROTHERS.

JACK SCREWS.

Devised by Dr. C. S. LONGSTREET, with Dr. A. McCOLLOM'S Improved Head.



This device is greatly prized by those who have used it.

PRICES.

Full Set, as above, Nickel Plated, screw and two extra bars	$2 50
Jack Screw, Nickel Plated	1 50
Bars, " " each	50

JOHNSTON BROTHERS.

FLOSS SILK.

That recently made for us is unsurpassed in purity, in fineness of fiber and in uniformity. Each spool contains twelve yards.

Price per spool	$ .15
Price per dozen	1 50

A liberal discount to Dental Depots and Druggists.

JOHNSTON BROTHERS.

TOOTH POWDER.

A good saponaceous article.

Price in bulk, per pound	$1 00
Five pound lots	4 00

JOHNSTON BROTHERS.

ROYCE TOOTH POWDER. (Excellent.)

Per pound	$ .75
Five pound lots	2 50

JOHNSTON BROTHERS.

STYPTIC COTTON.

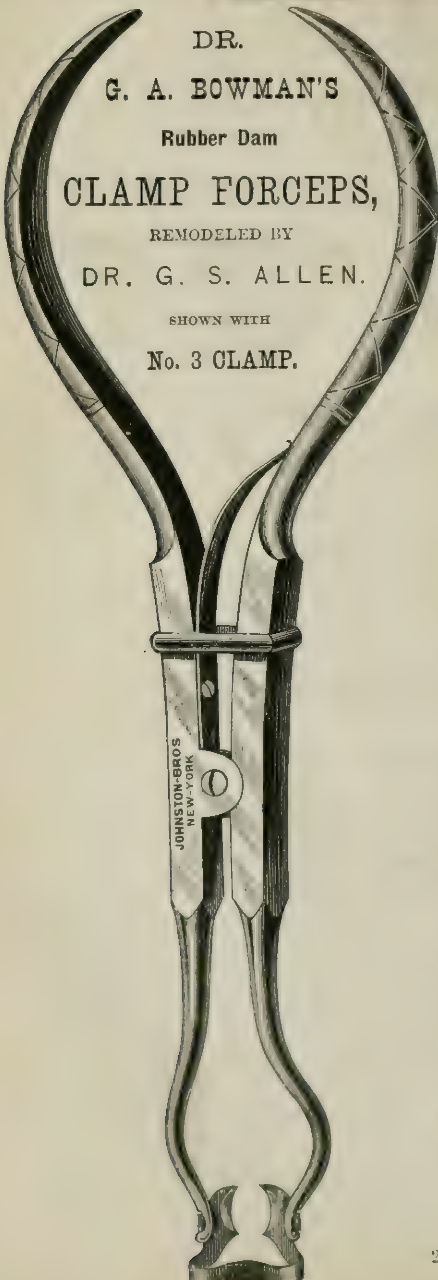
A most excellent article to staunch the flow of blood.

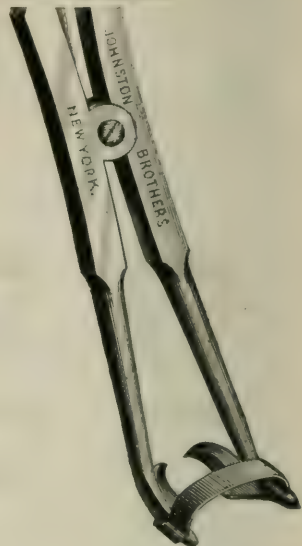
Per box	$ .30

JOHNSTON BROTHERS.

RUBBER DAM CLAMP FORCEPS.

Of these we offer two styles, both deservedly popular.





POINTS OF DR. T. C. ROYCE'S

Rubber Dam Clamp Forceps,

Shown with Clamp. Handles are exactly like the other style, (Bowman's.)

Both styles of these Forceps have points accurately adapted to the shape of the clamp at the neck, and hence will be found much more convenient than those hitherto offered the profession in this point of adaptation. (See also advertisement of Clamps.)

If so ordered we can supply either style of Forcep with a band, which will keep the Forcep and Clamp extended and ready for use when the hand of the operator is removed, as shown on the Bowman Forcep.

PRICES.

Forcep, either style	$3.00
" " " Nickel Plated	3.50
Complete set of Clamps, embracing eight forms	4.00
Complete set of Clamps, embracing eight forms, plated	4.80
Clamps, each	50
" plated	60

JOHNSTON BROS.

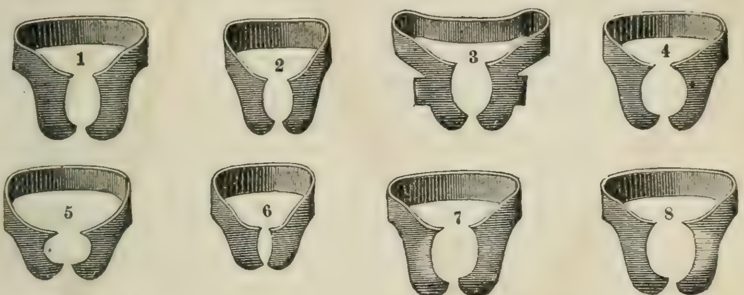
We were never more sure of doing signal service to the Dental Profession than now in offering the

IMPROVED

Rubber Dam Clamps,

INVENTION OF

DR. DELOS PALMER, OF NEW YORK.



Price, set of Eight,	Oil finish,	$4.00.	Each plain,	50 Cents.
	Nickel plated,	4.80.	" Nickeled,	60

For use with Rubber Dam Clamp Forceps.

These Clamps are designed to be placed on the tooth at the commencement of the operation. Afterwards apply the Rubber Dam by passing it over both tooth and clamp.

DESCRIPTION.

Nos. 1 and 2.—Universal Clamp for Molars.

No. 3.—For posterior cavities in molars standing alone.

No. 4.—For third molars, or any molar of a cone shape. This Clamp can oftentimes be turned around while on the tooth, so as to place the bow of the Clamp out of the way of the operator.

No. 5.—For biscuspeds.

No. 6.—For lateral and central incisors.

Nos. 7 and 8.—Rights and Lefts.—For cavities under the gum, on the buccal or lingual surface of molars.

Cuts of two favorite styles of Rubber Dam Clamp Forceps will be found on another page.

These Clamps have prominent points of marked superiority over those of other manufacturers.

First. Each has been carefully adapted to the shape of the tooth for which it is designed, *under the personal supervision of Dr. Delos Palmer*, the inventor.

Second. A groove is made by us in the clamp, into which the forcep nicely fits, so that the clamps firmly hold their position on the forceps, when once adjusted, instead of tilting from one position to another—as is the case when no groove is provided.

JOHNSTON BROS.

NEW YORK COLLEGE OF DENTISTRY,

NINTH ANNUAL SESSION,

1874-75.

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Students may matriculate at any time, as the Infirmary is open, for regular students of the College to practice in, the entire year.

The regular course of Lectures will commence middle of October, 1874, and continue until the 1st of March. Three hours of each day of the week (except Saturday) will be devoted to lectures, and four hours to *Clinics*, and practice at the Chair, and in the Laboratory, under the direction of the Demonstrators.

It is with pleasure that we call attention to the removal of the College to more spacious, more convenient and permanent quarters. Our Infirmary is furnished with thirty good chairs and all the appliances. Our Lecture-room will seat, and our Laboratory will accommodate, two hundred students; all on one floor, and up one flight of stairs only.

Tickets for one year's Instruction, including Course of Lectures, Matriculation, Demonstrators', Diploma Fees, and Practice in the Infirmary the seven and one-half months between the sessions...	**$150.00**
For the Course of Lectures only.........	**100.00**
Matriculation (paid but once).........	**5.00**
Graduation Fees.........	**30.00**

Board may be obtained for from $4 to $8 per week.

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78 West Twelfth Street, New York.

HARVARD UNIVERSITY.

Dental Department.

BOSTON, MASS.

1874-75.

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Instruction is given during the Academic year, commencing on the 1st of October and continuing till the 1st of July, but is divided into two terms, attendance upon one of which is required for graduation, the other not. The first, or required term, begins October 1st and continues nineteen weeks. The second, or Spring term, which begins February 15th and ends June 30th, is designed to take the place of pupilage with private instructors, and affords better and more varied instruction than can possibly be obtained in any office.

The mode of instruction in the various departments is as follows, viz.:

ANATOMY.—Lectures, recitations and dissections under the direction of the Demonstrator of Anatomy.

PHYSIOLOGY.—Lectures, recitations and practical demonstrations in the Physiological Laboratory.

CHEMISTRY.—Lectures, recitations and practical work in the Chemical Laboratory, each student having his own desk and apparatus.

SURGERY.—Lectures, recitations, operations upon the cadaver, and clinical and operative surgery at the Massachusetts General and City Hospitals each week. A course of lectures on oral surgery will be given during the Winter term.

OPERATIVE DENTISTRY.—Lectures, operations at the Dental Infirmary of the Massachusetts General Hospital. There were upwards of five thousand operations performed during the last year.

MECHANICAL DENTISTRY.—Lectures and practical work in the Laboratory. The Infirmary provides an abundant supply of patients.

DENTAL PATHOLOGY AND THERAPEUTICS.—Lectures and recitations aided by specimens, models, diagrams and the microscope.

☞ The University Degree, D.M.D. (*Dentariæ Medicinæ Doctor*), is conferred upon those who fulfill the requirements.

FEES.

Matriculation, $5.00. Spring Session, $50.00. Winter Session, $110.00. For the Year, $150.00. Graduation, $30.00.

For further information address

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222 Tremont Street, Boston, Mass.

JOHNSTONS'

Dental Miscellany.

Vol. I.——*SEPTEMBER, 1874.*——No. 9.

THE RUBBER DAM.

Many and great are the difficulties which dentists have been compelled to meet and contend with, in the prosecution of their arduous duties, through all the past history of the profession.

Many of these difficulties are intrinsic to the operations themselves, and are quite enough to tax all the skill, patience, and nervous force the practitioner possesses.

But in addition to these are others intimately connected with, though not part of the operations, which materially increase the labor, and in large measure detract from the perfection of the result, in consequence of the limited control which it has been possible to gain over them.

One among these, and perhaps the greatest, is the danger of inundation from saliva, and the consequent ruin of the work. Hours of valuable time have been spent and lost in unintermitted battle with this aggressive foe. If the conflict resulted in victory, that victory was shorn of much of its pleasure by the excessive weariness consequent upon the protracted struggle which preceded it. If in defeat, the mortification of that defeat was intensified by the exhaustive waste of nervous force, and the terrible prostration which was its natural result.

Numerous methods and appliances have been devised and introduced, through the years past, for the purpose of controlling this difficulty. By the faithful and persistent use of some of them, a degree of success has been achieved, and good operations performed, though always at the expense of great labor to the practitioner, and great weariness to the patient. Oftentimes tedious operations, such as are termed "building up," or making "contour fillings," have been brought nearly to completion, when in a moment, by some slight movement

of the patient, or the sudden saturation of a napkin, or a copious discharge from a neighboring gland, a "tidal wave" has swept over the structure, and in a twinkling the whole been ruined.

Clamps for compressing the duct of Steno; tourniquets for holding coils of linen, or compresses of various materials; pumps for removing the accumulated saliva; wooden wedges driven tightly between the teeth to dam up the watery emissions; waxed ligatures wound closely around the necks of teeth; tongue-holders; indeed, almost every conceivable contrivance has been tried, with varying degrees of success, but still the obstacle remained, a sore vexation and hindrance to the dentist whose aim was thoroughness and durability.

But at length a bright day dawned—a day of conquest, of rejoicing, of relief. A happy thought entered the mind of Dr. S. C. Barnum, of New York City. Acting upon it, he devised and introduced a system of dealing with the dentist's arch enemy—saliva—at once practical and certain. This method consisted of using a thin sheet of india rubber, a material absolutely impervious to moisture, and so enveloping the tooth to be operated on, that perfect dryness could be secured during the longest operation.

After testing his new discovery, and proving its efficacy, he most generously gave it to the profession without restriction and without charge—a noble, unselfish act. Since that day, blessings innumerable have been invoked upon his head by dentists and patients. Increased facility in the use of the Rubber Dam has marked the passing months, until it is daily demonstrated that the appliance is capable of universal application and worthy of universal trust. Neither is it too much to assert, perhaps, that no new thing has been introduced to the profession, among all the vast array of inventions for ten years, which has been productive of so much comfort, and such good results, as Dr. Barnum's Rubber Dam.

This being the case, it may not be amiss to consider its virtues somewhat critically.

By the use of the Rubber Dam greater thoroughness of operations is secured.

1st. In the preparation of cavities.

No cavity can be perfectly excavated and prepared, unless every part of it is clearly seen. When moisture continually fills the cavity, only an imperfect view of it can be obtained.

Rays of light, as is well known, are refracted by passing through fluids, so that, in looking into a vessel filled with water, the sight does

not strike directly upon the point at which it is aimed, but upon another; for the line of vision is refracted or bent when it strikes the surface of the water, and the beholder is deceived; but when the vessel is empty the line of vision is direct from the eye to the precise point looked at. Now, if a cavity is filled with saliva, it will be at once perceived that there is less certainty of every point in that cavity being distinctly seen, and if not distinctly seen, then of course not surely reached by the preparing instrument.

Again, if the floor or walls of the cavity are covered with moisture, although not to such a degree as to refract the rays of visual light, still a glistening surface is given to the interior, which in a measure conceals or obscures it, and its exact condition is not so perfectly determined as when absolutely dry. This will not be disputed.

Now in preparing a cavity located on an approximal surface of a tooth, there is a constant invasion of saliva, producing the unfavorable results already referred to, and necessitating the continuous use of some absorbent, such as spunk or paper, to obviate the difficulty. But let the Rubber Dam be applied, and no hindrance from encroaching moisture is encountered. The entire interior of the cavity is clearly seen, its condition certainly determined, the instrument applied at the very point where it is needed, and a satisfactory preparation secured in all cases.

It is also contended that the application of the Rubber Dam to teeth, previous to preparation, reduces the pain of excavating sensitive dentine. Whether this is in consequence of the cut ends of the tubuli emptying themselves into the dry cavity, thus reducing the quantity of nervous fluid (if it be a fluid) which they contain, and consequently losing something of their conducting power, or whether the acuteness of sensibility which the said nervous fluid (?) possesses is somewhat obtunded by the unintermitted contact of atmospheric air, or whatever may be the cause, the desirable result is the immediate product of the Rubber Dam, and is to be set down to its credit.

When a cavity is prepared, and the filling ready to be introduced, no moisture can creep in under the gold, every piece can be placed just where it is desired, it can be thoroughly compacted, perfect cohesion of all the layers can be uniformly gained from first to last, no undue haste need interfere with the bestowal of all the care which is required, no premature termination of the operation is rendered necessary by the approach of the insidious foe, but the last piece can be put in as deliberately as the first, and the whole finished to the mind of the operator.

There is an array of advantages sufficient to commend any new thing, and it is no idle boast to claim all these for the Rubber Dam. But we can go a step further and consider the next of the trinity of desirable ends.

2d. By the use of the Rubber Dam the comfort of patients is greatly promoted.

No packing of the mouth with napkins is required. These distress a patient exceedingly, and are often quite painful, as well as uncomfortable.

No clamps upon the tongue or cheeks are necessary. The sense of being held in a vise is not experienced.

No cramping and straining of the muscles of the cheek is felt.

The terrible weariness caused by long continued holding of the mouth open, with no possibility of closing it through a tedious operation, is spared the patient, for he can occasionally close it without damaging the operation, and thus obtain most grateful relief.

The fear of strangling by reason of labored and imperfect deglutition is avoided, for the patient can swallow at frequent intervals, and in a natural manner.

The fear of spoiling the operation by an injudicious or necessary motion is not felt by the patient. He can be assured that no danger can result, so that his mind remains undisturbed through the entire sitting. And this is no slight matter. Patients often express themselves as completely "wearied out" by the constant apprehension that they might in some incautious manner do fatal damage to the operation. Take away from them this anxiety, and much is done for their comfort while they are in the chair.

This long array of good results, be it remembered, is to be set down to the credit of the Rubber Dam.

Next, expedition is promoted by the use of this appliance.

No time is lost in constructing and operating defences against saliva. The whole attention of the dentist can be devoted to his work. Having a feeling of security, his manipulations are without nervous haste, well directed and effectual, and the result is more rapid progress toward completion. Again, the operator's mind being free from apprehension, there is no diversion of his thoughts. He places his gold just where he desires, and drives it home, while the satisfaction he experiences at the perfect control he has over the case imparts celerity to his hand, and the result is expedition.

Experience in the use of this appliance will enable the dentist to

adjust it in every case, and the new inventions of clamps, together with the method, already familiar, of using ligatures about the enveloped teeth, will effectually secure it in place, and present to the eye and hand of the operator, the objective point of his labor.

It is not necessary at this day to enter into details as to the *modus operandi* of applying the Dam. The profession pretty generally understand these details. It may not be amiss, however, to give a few suggestions drawn from experience.

A large sheet is more convenient than a small one. The ends hang out over the shoulders, and the curtain falls down over the chin so far as to retain their place and keep out of the way. Small pieces are continually curling up and obstructing the sight, or presenting an advantage to the saliva, unless the piece is constantly held.

Several teeth besides the one or more to be operated on should be enclosed by the rubber, as a better view is obtained, and less hindrance experienced by folds of the appliance. On short or conical crowns, where the shape is unfavorable for holding the Dam, one of the recent improved clamps, slipped down to the neck of the tooth over the rubber, will hold it effectually.

The ingenuity of the dentist will suggest various little devices for the conquest of minor difficulties which may arise in connection with the use of the Dam, by the employment of which they will vanish before him. And to the ingenuity of the dentist these must be left.

To sum up it may be said: By a progressive and faithful dentist, nothing valuable is disregarded, and among all valuable adjuncts and accessories placed at his disposal, he will find none more promotive of good to himself and his patients than Dr. Barnum's Rubber Dam.

OUR LONDON LETTER.

July 3d, 1874.

I do not know that there is much to write about just now. The Odontological Society has held its last meeting for the session, which has been so far a very successful one. The profession generally is busily occupied in harvesting the material which is to carry them through the little holiday to which we all look forward, and in which we all fondly imagine so much pleasure is in store for us. Alas, how often we are disappointed, and have only to look back to a time of vexa-

tion and worry, and then wish we had stayed at home. Well, if we did stay at home, I suppose we would then wish we had gone ; and if an illness should overtake us, our faithful helpmates would not fail to remind us of our ill-judged parsimony in not taking a holiday. Perhaps the gushing creatures are right ; but somehow or other, illness comes to "those who stay and those who roam," and it sometimes happens that the one who goes away brings the seeds of illness back with him. Still, an annual holiday has become an institution, and I suppose we must submit to the mild but firm sway of fashion. Some of the members of the profession who read the *British Journal of Dental Science*, were surprised to read of a wonderful discovery made by a correspondent who has been good enough to publish it for the benefit of his fellows. As the gentleman is one of the surgeons of the Dental Hospital, and has to teach the rising generation, his opinion is no mean authority. The gentleman has been to Paris, and seen Dr. Bing plugging teeth with non-cohesive gold. He details at some length the wonderful things he saw done, but on the *modus operandi* he preserves a discreet silence. He however manages to quote Lord Bacon, and to say that "knowledge is power ;" but for all the knowledge one gets from his letter, it may mean the power of concealment. The great secret is, however, divulged, which cost a journey from London to Paris, and a week beside the chair of Dr. Bing to discover, and be forever fixed in the mind of the writer ; and here it is in his own words, italics and all.

"Of this I am positive, that there is yet another and more expensive material than any gold, which must be used in the process of filling teeth ; I mean *brains.*" I hope you may think this discovery worthy the publicity of your journal. It is freely given, freely as Barnum gave us the rubber dam. I hope it may be as useful.

The author must clearly be unable to stop teeth, or else he has brains which he was not aware of till he went to Paris.

There is now a movement being floated for erecting a bust to Edwin Saunders in the Dental Hospital, in recognition of his efforts in behalf of that Institution. The affair was very clumsily started, but an influential committee are about to take the matter up, and I have no doubt but that its own merits will carry it through.

The *Philadelphia Medical Times* for May 16th is very rough on the dentists for desiring to be ranked as medical men. I fear that there is enough truth in its view to justify its blunt speaking, and think it gives good assurance when it says that when the dentists "comply with the rules generally adopted by the medical profession, and measure up to

its standard, that profession will receive them with open arms, not because they are dentists, but because they are doctors." But what says the same journal about this profession, which is to be the standard for dentists? In an article called "The Annual Overflow," here is one out of many other hard knocks. "How can a profession be honored, which sells its birthright for a mess of pottage? How can any body of men be distinguished as a whole, when a few hundred dollars and a few months' work give admission to its ranks. * * * But assuredly the spectacle of grave critics searching assiduously for the causes of the profession's low estate, when the mud of the quagmire is on their own persons, is most laughable." To one at a distance it seems that a dentist seeking to enter a profession so described by one of its own champions, would be asking for bread and receiving a stone. I have somewhere read of a mote and a beam. What does the editor of the *P. M. T.* think?

But perhaps his all-round plain speaking ought to recommend his advice to our profession.

I should have thought, from the way in which conservative dentistry is followed in America—at least in some of the dental meetings—that artificial cases would be but a small part of a man's practice. Such, however, does not seem to be the case with a gentleman who wishes to congratulate the public and the profession on the triumph of the celluloid base. He says he has used it for two years, and also most of the other bases in the market, and that he has "inserted hundreds of cases." Alas for conservative dentistry! Hundreds of cases in two years, besides cases of almost all other bases in the market, and all in the practice of one man! Can the occasional advocate for this base, a piece of which, carrying teeth, was worn eighteen years ago by a gentleman in London, tell us of any experiments upon its powers of resistance? Has it been tested first as to the weight it could bear and resume its original shape again, then as to the weight it could bear and remain bent, and then as to the amount it could bear up to breaking, and these same tests applied to the same mass and shape of vulcanite, and then the two compared? Has its resistance ever been tested at the heat of 80° Fahrenheit—a modest temperature for the mouth? The answer may be that hundreds of pieces have been made in two years without breakage. But breakage is not the only calamity which can befall artificial work, and two years is a short time on which to establish all-important conclusions. VAGRANT.

SPONGOID, THE NEW ABSORBENT.

By J. Albert Kimball, D.D.S., New York City.

Not having seen any reference to this article, recently introduced into the department of operative dentistry, I take the liberty of calling attention to it. Having employed it constantly for the past three months, I am of the opinion that it is of sufficient merit to deserve a friendly recognition at the hands of the dental profession.

To those who have had no opportunity of examining it, a brief description may be interesting. The article is designed, so far as its application to dentistry is concerned, to supply the place of prepared cotton, spunk and bibulous paper in drying ordinary cavities. In appearance it resembles white blotting paper, and the substances of the two articles are doubtless quite similar; but the spongoid is more fibrous and much less compact, owing, of course, to a different quality of material and a different treatment in the process of manufacture. And even common blotting paper is not a contemptible absorbent for dental purposes, as I learned years ago while treating a tooth for a little patient in the country, without the usual accessories of the office.

The spongoid is prepared in three forms: first, in small round discs, second, in long strips about one-fourth of an inch wide, and third, in square sheets nearly the size of a sheet of gold foil. I prefer the latter form for ordinary use, as it can be easily torn into pieces of any required size and of sufficient softness to be pressed into all the inequalities of the cavity to be dried. The three forms are of various thicknesses, to enable them to meet all cases. The discs are of different sizes, and possess the advantage of being always ready, while the strips give less trouble than the sheets in reducing them to pellets of suitable dimensions; yet the process of cutting so condenses the edges of the discs and strips as to greatly lessen their adaptability, and for this reason, principally, I choose the sheets.

The absorbing power of this substance is marvelous. Place a drop of water upon a slab and approach it gradually with one of the discs. Upon the slighest contact the drop instantly disappears, and the disc becomes uniformly charged with the moisture. Dip one end of a strip of spongoid in a glass of water and almost immediately the fluid ascends to its entire extent and the strip is completely saturated. Nothing but

the best of marine sponge can equal the spongoid in its absorbent properties.

Regarding its practical employment, I see no reason why the spongoid should not supersede, in ordinary cases, all substances heretofore used. It cannot, however, supply the place of cotton in drying pulp cavities, nor that of the arch detective spunk in discovering the presence of slight moisture. I venture no extravagant predictions concerning the spongoid, but I dare say it will, sooner or later, of its own intrinsic merit, assume its proper and natural place in the dentist's repertoire, and become a valuable adjunct to his operations.

It is, doubtless, in surgery that this preparation will find its most important and appropriate work. For this department it is medicated so as to act as a styptic, an antiseptic, a counter-irritant and vesicant, an anodyne or a disinfectant, as well as an absorbent. It is needless to suggest that these medicated forms may be of occasional use in our own profession. I have myself employed the styptic spongoid, and find it admirable. It is less unpleasant and far more convenient and cleanly than Rohland's styptic cotton, and equally effective as an article of ready application. There are sheets expressly prepared for large suppurating surfaces by being thickly perforated. The sheet itself, which has been treated with carbolic acid, or some other antiseptic, absorbs and neutralizes the serous portion of the effusion, while the more concrete portion escapes through the small openings, and is removed when the sheet is detached. An eminent surgeon of this city assures me he finds it of great value in this class of cases, and it has been successfully employed in Europe for similar purposes.

In conclusion, I may perhaps be permitted to say, incidentally, that in my practice I use absorbents but little. Where there is danger of the cavity becoming wet in excavating, I usually attach the Rubber Dam, and it is then in place when I am ready to insert the filling. The dentine is less sensitive if excavated dry, and the debris of excavation does not require the syringe, as it may be most thoroughly removed by a bit of cotton or spongoid slightly dampened with chloroform. That the latter agent in evaporation leaves no moisture behind, I have repeatedly proven in cases where the gold became accidentally wet during the process of filling. After adopting means to prevent any further access of saliva, I have bathed the surface of the interrupted plug with chloroform, and when the volatile fluid had escaped, proceeded with the operation, the gold adhering with almost, if not quite, the same tenacity as if nothing unfavorable had occurred.

NEW YORK ODONTOLOGICAL SOCIETY.

"THE ESTHETICS OF DENTISTRY."

By NORMAN W. KINGSLEY, M.D.S., D.D.S.

Continued.

It is not to be expected that the artist, be he manufacturer or dentist, will conform strictly to the forms before illustrated to any great extent. The instances in which one peculiar shape is the very best that could be selected as adapted to all the requirements of the case are few, compared with the whole number. In the type presented we find a beauty of form that is rarely seen except in youth.

The undulation of the cutting edges of the incisors soon gives way in the friction of antagonism, to a line more nearly square with the sides of the teeth.

Any one of but limited observation has noticed, in many cases, the serrated edges of the incisors, both superior and inferior, immediately after eruption, and also that in a little time this peculiarity has passed away.

This wearing away of the antagonizing ends of the teeth is the most natural modification of the perfect form of the tooth, and is common to them all.

A great variety of forms can be made, all harmonizing with what we see in nature, by taking a well developed type, and producing the appearances above indicated.

Thus, by cutting off the ends of the teeth as exhibited in the illustration, we give the semblance of age, and that without in the least changing the form of the upper portion.

By having the mind clearly impressed with an ideal standard, appropriate selections from a ready-made stock will be more easily made ; or when the desired form is not supplied, changes may be secured to a limited extent by grinding. One thing is to be especially avoided. mannerism. The adoption in all cases of any type, or its variations, however excellent, can only end in deformity.

Too many artists are mere mannerists, either by carrying some single idea of their own into all their works, or, what is more common, copying the modes and peculiarities of genius, and thus caricaturing, rather than imitating nature. Mannerism is always an evidence of weakness.

For a complete knowledge of probable and possible variations, the student must be a close observer of nature. His standard of beauty

will finally be the result of the rejection of nature's defects, and the combination of her excellencies. Imitate nature rather than attempt to copy her. A copy of any one presentation would not probably convey as pleasing an impression as an adaptation of an imitation by an artist who had thoroughly studied the requirements of the case.

That method of making artificial teeth which requires, for success, the possession of the highest order of artistic talent, is undoubtedly carving.

In these cases the artist cannot to any extent copy nature ; he is compelled to imitate her, and upon that art which conceals art his success depends. Not only must he carve each individual member with a character which shall harmonize with the external features, but the arrangement (or "grouping," as an artist would term it), must be the result of most careful study. There is another style of work which requires a lower order of talent, but in which the results are in many cases quite equal to the best efforts at carving. Continuous gum work, known as the invention of Dr. John Allen, is the result of the arrangement of single teeth in any desired form, and the completion of the operation by forming around them an artificial gum.

No doubt, if the teeth in the market were in form, color and variety, all that is needed to meet the requirements, this method of forming an artificial denture would be all that art demands. It would then possess all the merit of carved work, and in some respects afford even greater opportunity for artistic display ; being also much easier of accomplishment. As it is, the same taste and study are required in grouping, as in carved blocks.

Absolute rules cannot be given for this art. Suggestions only can be made which may prove a valuable aid. It must be borne in mind that we are not dealing with the natural organs, and some allowances and deviations must be made for that almost imperceptible difference in appearance that exists in the artificial ones, even when they are the most perfect of their class.

Well-formed natural teeth please the eye when symmetrically placed even close together in the arch.

Artificial teeth under like arrangement nearly always betray their origin.

The following suggestions to the painter are equally pertinent and applicable to the dental artist :

"Nature never repeats herself, even in two sides of a leaf."

"Such precision belongs to machine work ; and, in studying nature,

we learn that variety is no less necessary to a pleasing composition than unity. To the grace and beauty of the whole work, harmony is indispensable. Without harmony each part may fail of the effect intended, however true in design. There must be harmony of line, harmony of grouping, harmony of light and shade, harmony of coloring, harmony of expression ; each part must be so adapted as to correspond to the rest. The attitude must be in keeping with the expression ; the color, with the subject treated ; and the accessories must be true, both to the character and the age represented : a harmonious whole is always more or less pleasing in itself, independent of subject or style."

The application of these principles for a number of years in the arrangement of artificial teeth, has satisfied the writer that in no other way can so pleasing effects be produced.

The gratification of the eye by a judicious deviation from uniformity is nowhere more strikingly illustrated than in landscape gardening. The traveler who is familiar with the ancient parks or gardens of the continent of Europe, laid out with all the regularity of squares on a chess board ; the trees and shrubbery often trimmed or twisted into fantastic shapes unlike the free growth of nature—experiences a sense of great relief, in visiting the parks of England, where the art in the arrangement is less mechanical and more concealed.

This formality and stiffness is not displeasing at first, to the uncultivated, but the eye soon wearies of it, and seeks relief in variety. It is this action of the mind we must consult in the arrangement of artificial teeth ; and in doing so, it does not follow that the mind will be able to recognize the cause of that which gratifies it. The esthetic sense may be fully satisfied without being aware of the true reasons of the satisfaction.

We have shown the undulations of line manifest in every view of each tooth. To harmonize with this character we must avoid straight lines in the arrangement of the whole. The teeth ought to be so placed that their cutting or grinding ends will not all be upon the same level. There is no better way of arriving at a correct taste or judgment in this arrangement than by an observation of the most symmetrically developed skulls at our command, and by a comparison of such with those of a lower order.

By universal consent, the highest type of physical and intellectual beauty is accorded to the Caucasian race, and the skull shown in Fig. 1 is one that may be studied with profit.

Our attention will be particularly drawn to the general uprightness

or vertical line of the profile, and the correspondence of the teeth with that line.

In teeth and jaws harmoniously developed, with such a well-developed cranium as here shown, there is found the highest standard of beauty in the arrangement of the teeth. The six or eight front teeth—all that are particularly exposed to view in life—neither protrude nor recede; there is no marked peculiarity about their position which would suggest the possibility of improvement. The canine teeth, which in many skulls are so large or so prominent as to suggest the origin of their name, are here moderate in size, close within the circle, and inconspicuous. Any material deviation from such an arrangement in an otherwise symmetrically developed skull will nearly always incline to deformity.

Fig. 1.

By cutting off the cranium from the maxillary portion, by an imaginary line passing from the condyloid process through the socket of the eye, it will be seen that the relation of the brain in size to the lower part of the face, is as two to one, *i. e.*, that two-thirds of the skull is given to the brain, and but one third to the jaws. Passing now to the skull of a negro, as shown in Fig. 2, we see a marked change in all the points to which our attention was given in the Caucasian. The cranium is diminished proportionately; the maxillary apparatus is increased. The profile is much inclined; the jaws protrude: the teeth

correspond with this protrusion, and the canine teeth are larger and more conspicuous.

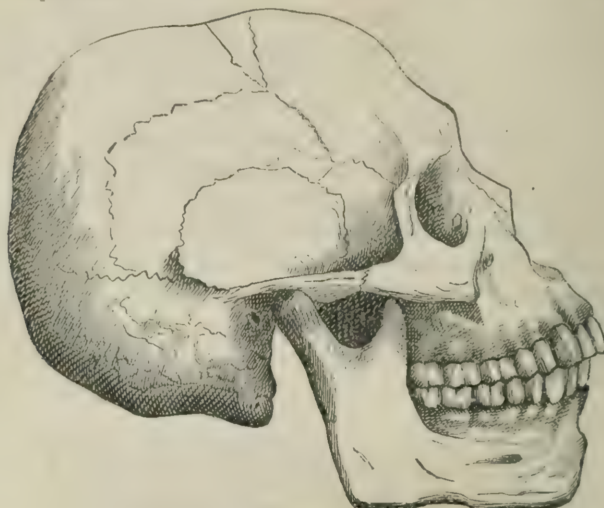

Fig. 2.

Drawing a line from the condyle to the eye, as in the former case, we find the skull nearly equally divided. Evidently the intellectual

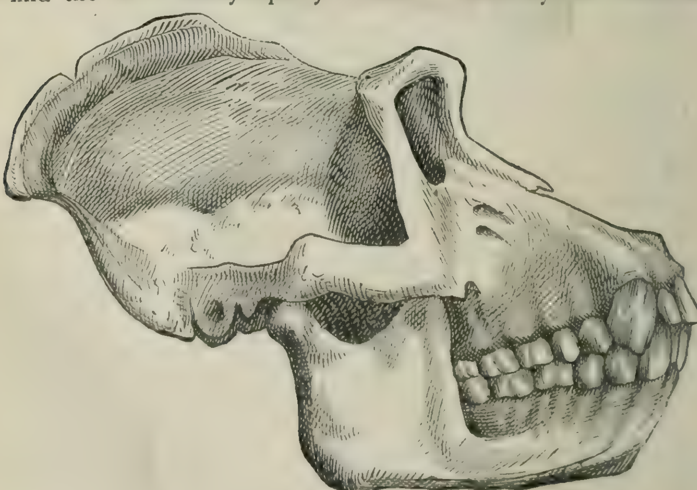

Fig. 3.

qualities are more feeble, and the animal more pronounced. Our next illustration is from an order below the human, and yet with strikingly

similar characteristics. Fig. 3 represents the skull of a gorilla, which may be accepted as the extreme of the Caucasian. Here the relation between the cranium and jaws is exactly reversed. The brain occupies one-third of the skull, and the jaws two-thirds.

Equally marked is the great increase in size, in prominence and power of the canine tooth.

Attention has been thus particularly given to the canine teeth, because their size and position in the arch affects the expression of the face more than that of any other teeth. There are many instances in the setting of artificial teeth that require a variation in the position of the canines, to correspond with general but marked peculiarities of physiognomy, but caution and good taste must be exercised in this determination, or characteristics belonging to the inferior races, or to mere animals, will be portrayed.

Fig. 4.

The line of the cutting edges, as before stated, must not be a straight line.

Fig. 4, copied from a well developed upper jaw, is evidently the type toward which we should approximate. This view shows that line to be a double curve; dropping in front and elevated at the back. The same line marks the edge of the most beautiful upper lip being doubled to represent the whole lip, and is familiarly known as the form of "Cupid's bow."

The line of the lower jaw is the same as the upper jaw from the last tooth forward to, and including the bicuspids, and from thence, in the lower jaw it curves upward; thus making provision for that natural lap of the superior incisors over the inferiors. Fig. 5 shows a type of a lower jaw which articulates with the foregoing upper one, in which the difference of line is clearly manifest.

Fig. 6 will show a very common form of the arch or circle in well developed jaws.

It is not shown here as a standard to which all artificial dentures should conform.

In fact, the adoption of any such standard would be likely to produce more deformity than it would correct: but this drawing represents an average presentation, and as such is worthy of reference and criticism. The best width of an artificial denture in any given case must be governed by utilitarian, rather than esthetic influences; nevertheless, the width at the back being decided upon for masticating purposes, the form of the arch in front is often quite under our control

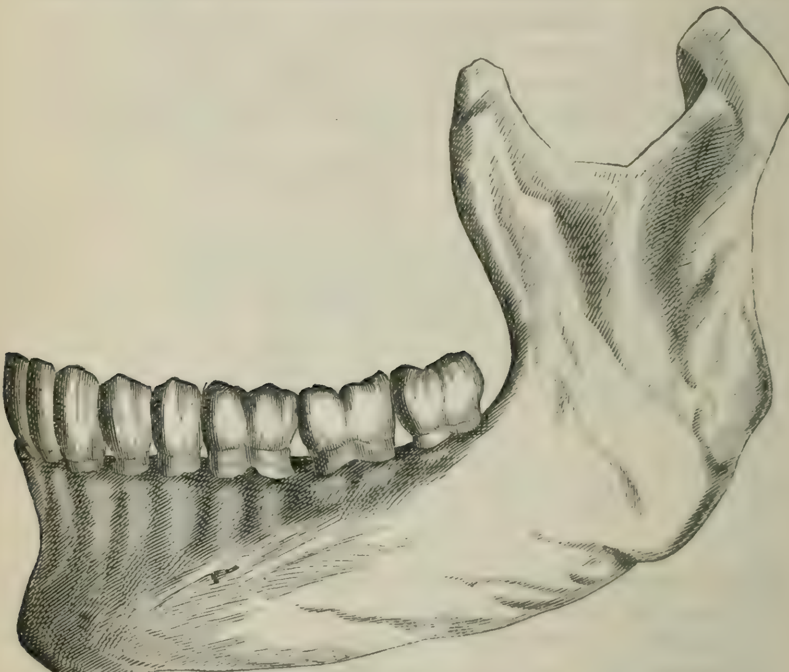

FIG. 5.

In the drawing it will be seen that it is anything but a semi-circle or a true curve.

What strikes us most particularly is the position of the canines, which almost give a corner to the arch. If the denture was for a rugged face, full of strong lines and marked character, it might be admissible to make the canines still more prominent; but in the face of a delicate lady, with the features all rounded and symmetrical, even so much prominence as is shown in this drawing would be inadmissible.

The more regular the features, the more difficult it is to avoid regularity in setting artificial teeth without producing deformity; for deformity is only relative, and what would deform one would enhance beauty in another. But there are some other peculiarities about this drawing that it is well to copy to a considerable extent, and those are the lines that flow back from the canines to the last molar. It will be observed that the two bicuspids and the adjoining two molars are nearly on a straight line, and that the third molars stand wider apart, thus at the back the teeth curve outward rather than inward—the very reverse of a semi-circle. When the arch is wide at the bicuspids in a person of delicate form, the effect is very disagreeable.

For the position in the arch, an almost indefinite variety is admissible; comprehending their rotation on their axes, the spaces which

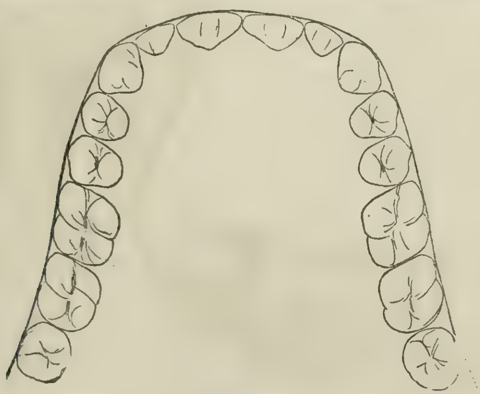

Fig. 6.

separate them and deviations from a uniform curve. Artificial teeth will always look better if placed so that the form of each is clearly relieved against the shadow of the spaces between them.

A compact row in an aged person, where there are many external evidences that nature is giving way, strikes almost any one as an incongruity. With age we see a shifting of position of the natural teeth which is in perfect harmony with the wasting of muscle and tissue which characterizes advanced life.

For the best artistic effect, the spaces between the teeth should not be uniform in width, but there may be comparative uniformity in the two sides of the mouth.

In general the central incisors will look better if nearly or quite in contact, but may be relieved by a space between them and the laterals.

The canine may, or may not, be separated from the lateral by a decided space, but a considerable vacancy may be left between the canine and bicuspid without any detriment to beauty.

In addition to the variety that may be caused by a judicious distribution of spaces, a most wonderful effect upon the expression will be caused by the partial rotation of a tooth, or by giving prominence to one or more in the arch.

For natural expression, the central incisors and canines must occupy a fixed and unalterable location.

The centrals control the *profile* of the mouth, while the canines support and give character to its *corner* ; the two most important points in the whole arrangement.

There can be but little or no deviation admissible in the location of these teeth, but a partial twisting or a different inclination may often be resorted to with good effect.

The central incisors will, however, generally appear better by having them stand with their flat faces on a line with each other, but the canines may be rotated slightly, in either the same or opposite directions, without disfigurement.

The lateral incisors and bicuspids should occupy positions subordinate to the canines and centrals. Considerable latitude may be shown in placing the lateral. It may have a greater inclination toward the median line than the others, or it may be twisted more on its axis ; the anterior corner of the cutting edge may be thrown forward of the central, or the whole tooth may stand within the arch ; either method carried to a limited extent will add to the naturalness of the effect.

The bicuspids should stand with a curved line formed by the centrals, canines, and molars, partially hidden by the prominence of the canine.

The foregoing remarks apply entirely to the construction of an upper denture, but are of greater force when an entire upper and lower denture are to be supplied.

The character decided upon for the upper will govern the character to be given to the lower set.

Where any great number of the natural teeth remain upon the lower jaw, and an entire upper set is to be supplied, the character of the lower teeth will influence the form and arrangement of the artificial ones, and thus the suggestions before made will be modified to meet the case.

Perfect harmony would therefore require that noticeable defects or

irregularities in the lower natural teeth should be imitated in a modified form, in the construction of the upper.

Thus, marked irregularities of position, below, will indicate an irregular arrangement above, but not necessarily to the same extent.

Permanent discolorations on the surface of the natural teeth would also indicate a modified imitation of the same on the artificial.*

It is the comparative perfection of artificial teeth, together with their stiffness and formality, which, even if the color be appropriate, betrays them in persons of full age.

Tricks or devices may be justifiably resorted to in such cases. The grinding of the cutting edges to produce the appearance of a natural tooth broken or bruised by abrasion, is such a device, and may be adopted occasionally with much benefit. Not that there is any intrinsic beauty in a broken tooth ; nor that there is any charm in its contrast with a perfect one, but the eye is so accustomed to see these slight defects in the natural teeth, that it comes to regard them as only allied to nature.

The insertion of gold fillings in exposed portions of the teeth is another trick which can sometimes be made available with propriety. In the construction of a partial set, where there are fillings in the natural teeth which are exposed to the ordinary observer, harmony demands that there be no large number of artificial teeth inserted, perfect in their form and appearance. It is then eminently proper to adopt this device, but the filling should not be conspicuous or obtrusive. In making an entire set, this trick has very little to recommend it. The means at our command in such cases are sufficient to enable us to conceal our art without resorting to the questionable device of suggesting to the mind, decay, and thus induce the inference that the organs are natural. In the case of the partial set, harmony with the exposed natural teeth demands it, but in an entire set it is of doubtful propriety.

The manufacture of porcelain teeth is one of the most difficult of arts, and when in its infancy its best results were found among the few dentists who had to some extent obtained the mastery over the most refractory of ingredients, and who had the ambition and genius to excel in carving ; but the difficulties to be overcome were such as naturally to

* In 1852 I was called upon to insert an upper set of teeth where the natural lower teeth were sound, but stained by long neglect, in marked and irregular spots over the surface.

After finding myself unable to remove the discolorations, I resolved to imitate them, and carved a set of teeth and stained them in the baking with a preparation of *terra di sienne*. After they had been worn a year they were exhibited in the mouth of the patient to the Jurors at the "World's Fair" in New York in 1853, and elicited their highest commendation. *Vide* Juror's report.

deter others from the desire to obtain knowledge under such adverse circumstances, and in due time the manufacturers perfected their wares, so that none but an exceptional few could have excelled them. The average dentist is therefore not only compelled to accept such as the market affords, but it is more than probable that his patient will be better served by a judicious selection coming from his own cultivated taste than by any attempt of his own to manufacture them.

With gum teeth for plate work there is but little latitude for artistic effect consistent with the mechanical execution; with blocks made for rubber there is still less freedom of arrangement for the operator.

Single teeth without gums are the only ones that will permit us to exercise our taste unlimitedly.

In entire sets, where the absorption of the alveolar process necessitates a substitute to restore the contour, we find ourselves limited to two methods, viz.: the English method of forming the gum of vulcanite the same as the base, and a platina plate with a continuous porcelain gum; the continuous gum, as has been before remarked, presenting advantages in an artistic point of view, which are thus far unequaled.

Some effort has been made by the manufacturers to furnish an imitation of the continuous porcelain gum in a form adapted to a plastic base, and considering all the mechanical difficulties to be overcome, their efforts have resulted in considerable success.

Far more artistic talent, as well as mechanical skill, is required in making from a mould, a block of several teeth joined by a gum, than in the production of single teeth. The suggestions heretofore made as to their arrangement, applying here with the same force to the manufacturer as to the dentist in his adaptations to a special case. Many of the sections made for vulcanite, show conclusively that the artist who modeled them could never have studied nature very long, nor very closely.

There is often displayed far more of the artist's invention, than his imitation. Many of the little details which go far to influence the appearance of the whole, are often neglected.

For instance, the teeth will often be fused together with particles of the tooth body left between them before baking, or, what is equally common, to find the beauty of the tooth in its form, ruined by a V shaped separation between them, terminating in contact with the gum, half way up the tooth; or, again, to find the central and lateral with such a space on one side and the corresponding space filled up. The point of gum between the teeth is often pale and indistinct. In these blocks

the individuality of the tooth should be especially clear; brought out by a clean and well defined space, and the color of the gum between, in sharp contrast, or the *tout ensemble* will betray the porcelain character of the material used.

Prof. Austin says: "Artificial teeth should imitate the natural organs; yet there is a perfection of form and arrangement which it is not advisable to imitate. To disarm suspicion as to their artificial character, it is often desirable to impart a measure of irregularity. An overlapping lateral, a missing bicuspid, a worn canine, an incisor bicuspid or molar apparently decayed and filled with gold, an exposed neck from absorption of the alveolus, are among the legitimate devices of the skillful mechanician who has the 'art to conceal art.'

If there are any defective natural teeth remaining to be matched, still higher art is required. A perfect porcelain incisor is no fit companion for one that is partly broken, decayed, and discolored, and since no art can make the defective tooth perfect, and yet the patient retains it, there is no alternative but to give so much imperfection to the artificial one as shall take away that striking contrast which so painfully offends our esthetic sense of fitness."

It is questionable whether any suggestions or criticism upon the color and tone of artificial teeth will be of any benefit to the student.

That it is, in many respects, of equal or more importance than individual form, is undoubted; for with an artificial denture, faulty in form and bad in arrangement, if the tone and color exhibit good taste in the selection, it is a redeeming trait, and worthy of praise. But as the faintest shades are of so much importance in this matter, and as they are so undefinable, the names of colors and their variations often conveying a different idea from what was intended, that it is impossible to give more than the general suggestions of good taste. Fair teeth are admissible in younger persons; deeper hues are required for the aged. While we sometimes find in old persons, natural teeth, very fair to look upon, there is a seeming incongruity about it which we are not justified in imitating. It is safer to err upon the side of inserting those of a deeper tone than is really required, excepting when some of the natural teeth remain, and then faithfully match or at least select a color that harmonizes, and will not be obtrusive or conspicuous. The canine teeth in nature are less translucent and more deeply shaded than the incisors or bicuspids. This should certainly be imitated so far as the canines are concerned, but in the opinion of the writer, we shall produce a better effect with artificial teeth by *not* inserting bicuspids of a lighter shade than the canines.

The artificial tooth does not absorb the light as does the natural one, and when placed in shadow as the bicuspids *in situ*, they are rendered more conspicuous. Where natural teeth of divers colors are scattered, and the vacancies are to be supplied, it is our duty to harmonize in color each artificial tooth with its natural neighbor.*

It will be manifest that it is simply impossible to carry all the foregoing suggestions into practice with some of the methods of constructing sets of teeth now in use.

One of the greatest difficulties to overcome is the scientific one, viz.: to discover and combine in just proportions, the materials which will produce this wonderful imitation. In no other art with which the writer is acquainted, have imitations of nature been carried even now to such perfection. The making of artificial flowers has perhaps come the nearest to it. Certain it is, that of the materials which chemistry has already furnished us, it is possible to obtain most wonderful results. The color of a tooth is dependent principally upon the proportion of its ingredients; its tone upon the action of the fire in burning or baking.

The fault of many of the porcelain teeth of this country, is the crudeness or rawness in their appearance—a lack of translucency, which a little more heat would very much improve. It would blend the colors more perfectly, give them more vitality, and soften down the hard and angular lines of the mould. It is perfectly in the power of our manufacturers, with the matertals now in use, to make a general improvement.

One thing which is much wanted, is to increase the variety of darker shades; not by hurrying into the market a lot of poorly baked, blue or yellow teeth; but by a careful imitation of those organs in persons who have been habitually neglectful, until their teeth have acquired a tone or color which cannot be removed. While the dentist at large is dependent upon the manufacturer, he must cultivate his taste until he is able to select the most suitable shade which is prepared for him. When one or more of the front teeth are remaining, either above or below, in a fair state of preservation, a tolerably correct idea may be gathered of what is needed; and careful observation made of just such

* I was required on one occasion to insert the four superior incisors. One of the canines was of exceedingly fair color, the other was very much discolored by a black amalgam filling on its anterior approximal surface, which the patient on no account would have disturbed.

A block was made in which the side of the lateral incisor next the discolored canine was deeply stained with platina, and a most excellent imitation in color was produced, and the other teeth were vari-colored, grading in shade from one canine to the other. The effect was very good: destroying the conspicuousness which the discolored canine would have shown in contact with an unstained associate.

cases, as well as of all partial sets, taking into consideration the age, complexion, etc., will do much to improve his judgment and enable him to make suitable adaptations when he has no such help.

When we consider the infinite variety of the human countenance, and the equally infinite diversity in form of the jaws, which a dentist sees (no two being exactly alike,) and then consider that there are thousands with a conformation of jaw peculiar to each, who are wearing artificial teeth of exactly the same size, shape and color, in fact all cast in the same mould, and really belonging to but one individual, we begin to realize the paucity of our resources.

In the loss of the teeth, the absorption of the processes, and the wasting away of the muscles and tissues, as we have seen, the greatest possible detriment is caused to the expression of the human countenance.

The complete restoration of these features, with all their power of expression, by art—art so consummate in the selection, arrangement and adaptation of its means as to defy detection—is one of the crowning glories of dentistry as an art.

Dr. Allen : I do not see where I can add any strength to a subject so fully and ably presented. I would most cordially endorse almost everything contained in his address, for I have proven its truth by long experience. One or two facts occur to me in reference to a remark he made about iron teeth. It brought to my mind that on one occasion, in Philadelphia, I was introduced to a gentleman who was wearing a set of iron teeth. He was a caster by trade, and had had several sets of teeth made, but invariably broke them ; when he determined to take a cast of a set that fitted, and make an iron set. He thought he could make *strong* teeth, and he did. I saw them in his mouth, and examined them, and they were doing good service.

I was also forcibly impressed with Dr. Kingsley's ideas on the matter of taking a bite, because they are so true. If all dentists would bear his directions in mind, they would save themselves and their patients a great deal of time and annoyance. It is one of the most important steps in mechanical dentistry, to secure a good direction of artificial teeth. It is a very common thing for dentists to get them too short. They do not give length enough to keep up the due proportion between the chin and the nose. When the wax is placed upon the plates the lips should come together gently and without compression or restraint. It is frequently the case that the patient is under a degree of restraint

when the bite is being taken, so that it does not give the exact impression as it should. That is a very important point, and the dentist should endeavor, as far as possible, to overcome that, and have the patient shut the mouth naturally and correctly. The mind should be kept diverted, and the mouth closed as easily and carelessly as possible. The mouth also should be as little encumbered with wax as possible, for the more it is thus encumbered, the less likely is the operation to be wholly successful.

Dr. Atkinson referred to the extreme difficulty in getting a correct bite in cases where people had lost the teeth upon one side of the mouth, and been accustomed to chew upon the other side, and thus thrown the mouth out of line and symmetry.

He also most warmly and heartily commended the effort of the evening, and thought that it indicated an amount of study that scarcely any other individual has shown in the direction of the subject; we have been merely superficial mechanics, looking at externals, without grasping the principles that underlie the whole, and the sooner the profession comes to a recognition of principles, the quicker will it be able to recognize and appreciate the labor of each man in his special department.

Adjourned. WM. JARVIE, JR., *Recording Secretary.*

From the Popular Science Monthly, for August.

PRIESTLEY'S DISCOVERY OF OXYGEN GAS.

BY JOHN WILLIAM DRAPER, M.D., LL.D.

Animal instincts, when properly considered, are often found to be connected with physical laws. Even in the case of man, his gratifications and dislikes frequently originate in the imperceptible action of external circumstances, and those feelings, and the impulses to which they give rise, are, in the scheme of Nature, strangely bound up with other things, with which, at first sight, they seem to have no kind of connection.

Thus, with what pleasure the whole animal world rejoices at the coming of spring! There is a heart-felt delight, not limited to the higher races, but common to all. With the returning temperature birds, and beasts, and insects, prepare for the duties of a new year and everything seems full of animation and life. Even the illiterate man cannot look unmoved on the green tint stealing over the fields.

Perhaps his sentiments may in some measure be connected with a perception that there is a promise for the gratification of his baser animal appetites, and that this prosperous beginning will end in the production of corn and wine for his use. But, behind these, which are the more obvious, there are other causes for rejoicing—causes which can only be fully appreciated by the intelligent, and which have been made plain only by the advances of the highest branches of human knowledge.

How often is our admiration aroused by the work of mechanical artists!—the steamship, which, day after day, has continued its unceasing and successful struggles with the waves, or the chronometer, which, once wound up, keeps on for months together its regulated motion. Yet how far are all these contrivances outdone in the mechanism of every living man! Of his double nervous system, one part, the intellectual, observes its mysterious periodicities, its time of activity and time of repose, its time of wakefulness and time of sleep; the other never sleeps till death, but keeps up its incessant action; the beating of the heart, the introduction of air by breathing, involving millions of movements which never fatigue us, and of which we are indeed, for the most part, unconscious. And, now, who would suppose that these, the highest and noblest results of a far greater Mechanician than man, are ultimately connected with the return of the spring; and that, in fact, the continuance of the life of man is indissolubly linked with the putting forth of the buds of a tree?

Yet so it is; and surely we cannot spend an hour more profitably than in tracing that connection. Such studies are appropriate to all intelligent men. And, when another spring revisits us, we shall not find that this hour has been entirely lost. The reflections it may suggest will, perhaps, increase the pleasure with which we view the return of that great natural phenomenon.

In thus explaining to you the connection subsisting between the animal and vegetable kingdoms, I shall have, in the first place, to introduce an account of the great scientific discovery of the last century—the discovery of oxygen gas—an event rivaling in importance the establishment of the doctrine of universal gravitation by Sir Isaac Newton, in the preceding age.

Until the middle of the last century an opinión universally prevailed that the atmospheric air is a perfectly homogeneous and undecomposable body—that there is but one kind of air, that which we breathe, and though in mines, wells, and other deep and solitary places, substances somewhat analogous occur, they are in reality nothing more than

vitiated forms of atmospheric air, which has gathered poisonous qualities from mineral exhalations. From the remotest times these opinions had prevailed. Many of the Greek philosophers looked upon the Olympian Jupiter as only an emblem of the atmosphere, and little suspected that the day would come when that great god of antiquity would be anatomized, dissected, and his various parts and qualities displayed. How often do things which have struck one generation with awe become commonplace affairs in another!

It so happened that, though, from time to time, after the thirteenth century, different gaseous substances were accidentally encountered, they all possessed the quality of extinguishing the light of a candle, and were therefore incompetent to support combustion, and when breathed were destructive of animal life. The doctrine that these were only vitiated forms of the atmosphere seemed very plausible, and this interpretation was received until the middle of the last century, when the capital discovery was made by Dr. Priestley that the air is not a simple substance, and that there is a great family of analogous bodies, each of the members of which possesses peculiar properties. He completely broke down the ancient doctrine of the elementary nature of the atmosphere.

You can scarcely form an estimate of the immense consequences that followed this discovery. It was found not alone to affect chemistry, properly speaking, it threw a flood of light on every allied science. The chemistry of that day was overthrown. Without any exaggeration, I characterize it as the capital discovery of the last age, rivaling in its importance and in its results the great discovery of the preceding century, universal gravitation, by Newton. Extended by the chemists of England, France, and Germany, it has utterly exploded metaphysical physiology, which, taking its origin in the dark ages, has been the great barrier to the progress of rational medicine. Whoever will take pains to study with attention the works devoted to the exposition of that ancient system, must be struck with the impenetrable obscurity in which it is enveloped. You turn over page after page, and the more you read the more you become confused. It is a constant putting of words for things, of phrases for facts. Even in the hands of the most powerful writers, metaphysical physiology is essentially unintelligible; but not so with that other physiology which has arisen in our times—all its statements are clear, precise, distinct; it relies on the exact sciences, such as chemistry and natural philosophy, because it is itself exact. The progress of all the departments of human knowledge is often the

same. Two thousand years ago the pagans peopled Olympus with many gods; and so in the infancy of medicine the corporeal frame was peopled with many intangible forms—a soul, a mind, a vital power, an instinct, a nervous agent, an aura, and animal spirits without end. But a better knowledge of these things is fast teaching us the eternal truth that, as there is but one God in the heavens, so there is but one spirit in man; a presiding agent that supervises and directs all; that all the acts of life are brought about by the inhalation of atmospheric air; and that every living animal owes its so-called vital properties to the action of air within its system; that there thus arise oxidations and other alterations in the economy, so that not a movement takes place, nor a thought occurs, without contemporaneous structural changes. The introduction of air by breathing is, I say, the fundamental fact in physiology; nay, more, it is the fundamental event in the action of the brain. I rest my opinions not on scientific facts, though they are numerous and irresistible, but I go at once to an authority far beyond all chemists and metaphysicians. In vain the physiologist asks me to deny the combustive influence of air in the body, and affects a fictitious fear of the tendencies of such a doctrine. Shall I not believe the positive declaration of Him who is the artificer of these beautiful contrivances?—shall we accuse the Almighty of materialism when he tells us that "he breathed into his nostrils the breath of life, and man became a living soul"?

The circumstances that first direct the mind of a philosopher to discoveries destined to exert an influence over the whole human race cannot fail to be full of interest. So it is in the present case. It happened that Priestley, who resided near a brewery in the town of Leeds, in England, accidentally observed that the beer during its fermentation in the vats gave forth a remarkable aërial substance. The flame of a lighted stick immersed in it was at once extinguished, and the smoke floating on the top of the stratum showed that it was very heavy, a result which was perfectly confirmed by the observation that, invisible and intangible as it was, this air could be poured from vessel to vessel like water, and in the vats in which it originally occurred it would overflow their edges and descend to the door, along which it would run like a stream, its course being readily tracked by the expedient of putting a lighted stick into it, and observing the extinction of the flame. Moreover, he found that it would dissolve in water; for, if dishes of that liquid were placed where it had access, an agreeably acidulous and sparkling fluid, soda-water, was formed. And that the agent which

brought all these results about possessed a physiological potency, was proved by the fatal fact, too often known in such manufactories, that if by accident it was breathed, death at once took place.

The substance which Priestley thus first encountered was that known to us as carbonic-acid gas; it had already been studied under other circumstances by Black and older chemists. I mention it here because it led Priestley to that long-continued investigation of factitious airs, which was crowned by the great discovery of oxygen gas.

We have seen with what acuteness Priestley detected differences between the gas just mentioned and common air. It is a striking fact, verified over and over again in the history of science, that the most imposing results may be presented to the acutest mind, and their significance and value remain undetected. Priestley, in 1771, having exposed some saltpetre to the fire, disengaged oxygen, experimented with it, and even showed its energetic power in supporting the flame of a candle, and yet the value of these truths entirely escaped him. Three years subsequently he submitted one of the compounds of quicksilver to the force of the sun's rays, converged by a burning-glass, oxygen again escaped, and this time he secured his discovery.

He was not long in recognizing its importance. One after another, as the properties were developed, the value of their consequences was apparent. First, a lighted candle, far from being extinguished, burnt with increased brilliancy, and substances commonly reputed incombustible, such as iron and other metals, were consumed as though they were wood. The doctrine of vitiated airs disappeared at once. Here was a substance possessed of all the chemical energies of the atmosphere, only in an incomparably more intense degree. If there were vitiation at all, the air itself was a vitiated form of this gas. Then, too, he found that it could sustain completely the breathing of animals, and that, in reality, it was absolutely essential to the discharge of that function, a fact which led him to apply to it the epithet "vital air;" and lastly, that the atmosphere itself, far from being, as the ancients had supposed, a simple homogeneous mass, contained this substance as its active principle, mingled with four times as much of another different body.

Here, before explaining the consequences of this great discovery, and showing the position in which it stands, I may be permitted to spend a moment in relating the melancholy but interesting history of its author. It is a lesson which ought not to be lost. Born the son of a tradesman, who died while he was young, and left him very poor,

his early manhood was spent in the useful but tedious duties of a village school-master. His attention being turned to theology, he subsequently became the pastor of a Presbyterian church. We must not impute it to mental weakness, but rather to a pursuit of the truth, that in succession he passed through many phases of religious belief, and four different sects, the Presbyterian, Arminian, Arian, and Unitarian, received him as a votary. This is not the occasion nor the place to explain the causes that led him in this course. It is only for us to judge of so great a man with charity. But, imbued as he was with a deep religious sentiment, and feeling that even the most exalted objects of this life are not to be compared with the importance of another world, he regarded his philosophical pursuits as a very secondary affair, and gave much of his time and talent to controversial theology. He seems to have come to the conclusion that it was incumbent on him to make a religious war. As his biographer says, "Atheists, Deists, Jews, Arians, Quakers, Methodists, Calvinists, Catholics, Episcopalians, had alike to combat him." In more than a hundred volumes which he printed, each of these found an adversary of such force and vigor (and it was impossible with such a man that it could be otherwise), that their ablest theological writers were overmatched. By the established Church of England he came to be regarded with such feelings, that instances occurred in which those who had successfully answered him were rewarded with the highest dignities ; a circumstance which gave origin to his remark that he appointed the Bishops of England.

But this was not all. The first French Revolution broke out, and, his ardent mind imbibing with enthusiasm the seductive doctrines of the times, he added to his religious disputes those of a political partisan. As the different sects had in succession stood in fear of him, so now the government took alarm ; it knew his philosophical reputation and ability. The story is a sad and short one. A mob assembled round his dwelling, which they committed to the flames ; the houses of those who were known to be his friends shared the same fate ; he narrowly escaped with his life ; and for three days one of the chief cities of the nation was the scene of riot. All his philosophical instruments, most of them constructed by himself, his manuscripts, his library, the fruits of a frugal life, were destroyed ; and, eventually driven from his native country, in his old age he found an asylum in the United States, where Mr. Jefferson, then President, received him with kindness and distinction, and in America he died.

In relating this melancholy but instructive story, we cannot but re-

mark now Priestley forgot that the experience of all nations and of thousands of years has proved the utter impossibility of any one man convincing the whole human race, and converting them all to his views. He shut his eyes to that anarchy of opinion infesting the world, brought on in no small degree by such polemics as those in which he delighted. In an exact science, like chemistry, he could describe some new discovery, and every man in Europe at once admitted its truth. He never realized how different it is in politics and theology. The library of volumes he wrote on these topics has already dropped into that gulf of oblivion which has received all the works of the authors of the early and middle ages, and no man cares to learn what he wrote or what he thought of the matter. But not so with his philosophical labors; they stand out clear and distinct, monuments of the advance of the human mind in knowledge and power during the eighteenth century. His discovery of oxygen gas will last as long as the world endures.

From the life of this remarkable man we may draw a lesson—a lesson which the highest authority, with brief emphasis, has given us—"Study to be quiet and mind your own business." We here see a great man effecting his own shipwreck on the shoals of politics and controversial theology. To what an eminence might Priestley have attained, if he had limited himself to those objects for which Providence had so well fitted him, and abandoned the vain pursuits in which he delighted, to men of less intellect and force! How is it possible, in our times, for a man to be at once a great philosopher, physician, theologian, politician? He must make his selection of one pursuit and stand by it. Not that I would wish an intelligent man, whose opinions must always control or guide those of a large circle around him, to shut himself up from public affairs of great interest. If he perceives, in those to whom the authority of government is committed, a disposition to jeopardize national interests, and pursue an obvious career of profligacy, let him resist them with whatever influence he has, and give his support to those who are the upholders of the peace, prosperity, and happiness of the nation. I would have him set his face against all social disorganizers, and give no countenance to religious disputants.

In thus freely criticising, for your benefit, a character historic in science, I trust I have not infringed in an unkind spirit on the generous maxim, "Say nothing but good of the dead." I join in the dying exclamation of Crœsus, the King of Lydia: "Judge not of the life of a man until you have witnessed his death." And what can there be more

touching, or even more beautiful, than the last scene of Priestley's life? It dissipates the remembrance of all his disputations and all his errors, and shows us that beneath these there was a deeply pervading and redeeming faith. When his little grandchildren were brought to his bedside to bid him good-night, he uttered his last words: "I go to sleep like you, but we shall wake together, and I hope to eternal happiness."

To return from his life to his discoveries. Priestley soon found that oxygen—I give it the name under which it has subsequently passed—was absolutely essential, in all cases then known, to the support of flame and fire, and that animal life depended on it; that a man, by breathing in a limited space, would soon exhaust it of so much of this gas that suffocation would ensue; that the atmosphere, in reality, is a reservoir of it, from which everything possessing the attributes of an animal abstracts it. It has been shown by succeeding chemists, to such an extent does this abstraction go, that a single man will each year consume about 800 pounds' weight. Considering, therefore, the enormous amount of animal life, the same respiratory process being common to the minutest insect and the largest quadruped, there must be a constant tendency to alter the constitution of the air; for, in proportion as we take from it oxygen at each inspiration, we restore at each expiration an almost equivalent bulk of carbonic acid—a double change, the removal of a vital element, and the addition of a poisonous gas.

But Priestley also showed that, in artificial atmospheres, such as he made, animal life could not possibly be maintained if there were any great reduction of oxygen, or any great increase of carbonic acid. More recent experiments prove that the most striking physical and moral effects arise when men and animals are made to respire atmospheres of a different constitution—effects such as we witness in the case of chloroform and sulphuric ether—a remarkable discovery, not, as is commonly supposed, of only a year or two back, but made by Berzelius, who, twenty-four years ago, gave the most extraordinary, and in a scientific point of view the most important instance of the kind yet produced—the instantaneous and deep sleep brought on by the respiration of hydrogen; a fact which, in the recent discussions about the priority of that discovery, has been strangely forgotten. From the effect thus arising when the constitution of the medium we breathe is in any degree disturbed, it necessarily follows that, ever since animal life appeared on this earth, the composition of the air must have been nearly unchanged. But here arises a great and obvious difficulty. If the life of men and animals can only be conducted in such a medium as our atmosphere,

and if such extensive changes as I have described are constantly impressed on the air by those beings, how does it come to pass that, after the lapse of a few years, it does not gather a poisonous quality? There must be some agency at work, continually tending to prevent that result. The consideration of what that agency is, introduces us to the second branch of Priestley's discovery.

He had put some mice in a glass containing atmospheric air, closely stopped, and found, as usual, that they died of suffocation as soon as the air became sufficiently impure by their breathing; an absolutely poisonous quality being gradually assumed. But, if a few vegetable leaves, or a small plant, were placed in the glass, and exposed to the sun, in a very short time the poisonous quality disappeared, and the power of supporting animal life was regained. Here, then, was an unexpected result—a discovery that gave a solution to all the difficulty, and which has been verified in its minutest details by more modern experiments. It has revealed the great and interesting fact that plants and animals stand in a relation of antagonism to one another; that whatever changes the one tends to impress on the air, the other undoes; and that, while animals discharge their duty in consequence of their being living and moving things, plants perform theirs under the influence of the light of the sun; for these changes do not go on in the dark.

Let us look at these facts by the aid of modern chemistry, premising that oxygen is an invisible substance, existing in the air, and that carbonic acid arises from its union with carbon. When carbon burns, it is merely uniting with atmospheric oxygen, and the resulting carbonic acid escapes away under an invisible form. So, too, when a man breathes, he draws in oxygen from the air; it is distributed to all parts of his system, and, combining therein with carbon, turns into carbonic acid, which is expelled when he throws out his breath. Every animal, therefore, to use the language of chemistry, is an oxidizing machine, the physical end of its existence being to rob the air of oxygen, and put back, in its stead, carbonic-acid gas.

With plants it is just the reverse. As long as the sun is shining upon them, they take carbonic acid from the air, and, decomposing it by their leaves, they set free its oxygen, which escapes away; its carbon they appropriate. With it they form their various parts, their stems, roots, flowers, seeds; but they do this only so long as the sun shines, and when night or winter comes the process stops.

The animal, therefore, takes from the air oxygen, and turns it into

carbonic acid; the plant takes that carbonic acid, and turns it back into oxygen, which has thus discharged the great office of carrying carbon from the bodies of animals, and transferring it to the systems of plants. In what an interesting relation do the two kingdoms, the animal and the vegetable, thus stand to one another, not alone as respects the air in maintaining its constitution uniform by a mutual antagonization, but also as respects their own structures! The elements of which plants are formed have all been derived from the pre-existing parts of animals; and the elements of which animals consist, from the pre-existing parts of plants. To the classical scholar, what a beautiful commentary on the fictitious stories of antiquity are these modern discoveries! He calls to mind the metamorphoses that Ovid describes: the bore, perhaps of his school-boy life, the elegant amusement of his later years. He remembers how Daphne was turned into a laurel, and Adonis into a flower; the musical stanzas are no longer an empty sound, they are descriptive histories. The thing he has read of is actually so. These transformations, instead of being imaginary exceptions, are the common lot of life in this world. There grows not now a leaf that is not formed from the parts of animals that are dead; there lives not a solitary animal being which has not derived its constituent elements from plants.

[*To be Continued.*]

OXYGEN GAS AS A REMEDY IN DISEASE.

From New York Medical Journal.

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CHAPTER VI.

APPLICATIONS OF OXYGEN IN SURGERY.

The effect of oxygen upon open wounds or ulcers is very remarkable, whether the gas be inhaled into the lungs, or applied directly to the part.

The following experiments by Demarquay are of the greatest interest. An incision was made through the skin and a cellular tissue, and into the muscles near the axilla of a dog, and the wound maintained open for three days. At the end of that time, the wound was of a grayish color at the edges, and slightly red in the centre. The animal was then placed with its head in a receptacle of oxygen, the opening being

made to fit tightly to the neck by means of a band of india rubber. In two minutes the wound had changed to a lively rose-color. The surface presented small ecchymotic spots, which furnished a slight hemorrhage. At the same time an abundant serous discharge flowed from the surface of the wound. When the inhalation of the gas was suspended, the wound immediately changed its appearance. The rose-color was succeeded by a grayish hue, and the surface, which had been shining, became dry and dull looking, resembling a mirror which had just been breathed upon. This experiment was repeated upon several different animals, with similar results.

In the use of oxygen subsequently, in cases of great depression of the vital powers after capital operations, M. Demarquay observed, in several instances, the same effect upon the wound.

These observations are of extreme importance. They show the rapidity with which oxygen is taken into the blood, and the effect which it produces upon the reparative processes. They explain also the wonderful power which oxygen possesses, of inducing cicatrization in old and obstinate ulcers, and of which some remarkable instances will be cited hereafter.

Their bearing upon the treatment of the later stages of pulmonary phthisis by oxygen is also very important. That the introduction of pure, or nearly pure oxygen into the lungs in such cases should be followed by a certain amount of hemorrhage from the walls of cavities or the surface of tuberculous ulcers is what they should lead us to expect. They show also that the occurrence of such hemorrhage should not of itself be considered as contraindicating the use of the gas. On the contrary, it may coincide with the commencement of a reparative process.

Solutions of continuity in the lungs, however, have this peculiarity, that while they partake of the effect of the gas acting through the circulation, they are also exposed to the influence of direct contact. This is of itself capable of producing decided effects, as has been already stated in another connection, and will be hereafter illustrated.

Beddoes, even in the infancy of the use of oxygen, observed its effects upon obstinate and ill-conditioned ulcers. Among others, he quotes a case of scrofulous ulcers of the arms and of one leg, healed in a few weeks under the influence of "vital air."

Another case of ulcer of the leg, which had continued for eighteen years, and had been treated in vain for four years by Pott, and for seventeen months by Sharp, healed at the end of four weeks under the in-

fluence of oxygen. Six months after, there had been no return of the ulcer.

A third case is related, of an old scrofulous ulcer on the arm of a debilitated patient. The inhalation of oxygen, in gradually increasing doses, caused an astonishing effect upon the general health, but no tendency to cicatrization of the ulcer. On the contrary, after a time, an inflammatory action was set up. To counteract this, a certain amount of carbonic acid was added, and the inflammation was promptly subdued, and cicatrization took place.

Finally, in a fourth case, there was an ulcer on the leg four inches long and three inches broad, ill-conditioned, and of such a depth as to involve the muscles. After a year of treatment with a vast number of topical applications, together with tonics given internally, there was no improvement whatever. Oxygen was then resorted to, and a very rapid change took place. The general health, which was very much depressed, improved, the strength returned, the ulcer resumed a more favorable aspect, healthy pus was formed, and in fifteen days the sore had closed over three-fourths of its extent. In six weeks from the commencement of the inhalations, cicatrization was complete.—(*Considerations on Factitious Airs*, p. 65.) Demarquay describes (p. 792) three cases of phagedenic syphilitic ulcers of alarming extent, which yielded readily to treatment with oxygen. One had existed eighteen months, and had invaded the perinæum, the pubes, and the thighs.

Dr. Goolden, (*Lancet*, March 10, 1866,) reports two cases of fetid phagedenic ulcers, probably of syphilitic origin, which healed very rapidly under treatment with oxygen.

Birch describes a very remarkable cure of a rapidly-spreading syphilitic ulcer of the leg (p 78). He adds that no other remedy will compare with oxygen, as, in common parlance, "a purifier of the blood."

The increase of the recuperative power which oxygen confers has been taken advantage of by Demarquay to enable patients to withstand the shock of severe surgical operations, or the subsequent drain upon the strength which they entail. In debilitated subjects he employs it *before* the operation, to prepare them for it, and *subsequently*, to enable them to bear up against the after effects. He is confident that the mortality after operations can in this way be immensely diminished.

In other surgical affections, such as ostitis, caries, etc., especially when associated with anæmia, loss of appetite, and defective assimilation, oxygen is of great value. Demarquay cites a number of cases in point.

Chronic Pyæmia.—My notes present a case of this disease in which oxygen was apparently the means of rescuing the patient from otherwise inevitable death. W., aged fifty years, had been operated upon four weeks previously for stricture of the urethra, by external division. A few days after the operation, chills set in, and soon an abscess formed under the pectoral muscles of the right side. Another abscess soon followed on the left arm, and a third over the sacrum. By this time, his strength was reduced to the lowest ebb; he was unable to raise his head from the pillow, his pulse was 112, soft and gaseous, countenance hippocratic; vomited everything taken into the stomach. Tongue broad, dry, leathery, deeply fissured, of a light brown color. When I first saw him his friends had already given the necessary directions for forwarding his remains into the country, and a clergyman had administered the last consolations of religion. Within the preceding twenty-four hours a circumscribed pleuro-pneumonia had developed in the right lung. His case, sufficiently desperate before, seemed now perfectly hopeless. Nevertheless, with the consent of the attending physician, I determined to see what could be done by oxygen. About four gallons were administered every two hours, beginning at 11 A. M. Each time the gas was given, the color returned to the cheeks and lips, and the patient expressed himself as feeling "brighter." The pulse remained about as frequent, but seemed to gain a little strength. Before night the tongue had become moist at the tip and edges, there was less irritability of the stomach, and the pain in the chest had greatly abated. The gas was given every three hours during the night and the following day. The close of this day found the patient with a tongue moist throughout, pulse 108, no vomiting, no pain to speak of, in the chest; was able to take freely of stimulants and beef-essence. From this time he gradually but steadily improved. The pleuro-pneumonia disappeared without running through the usual stages. The appetite returned to a moderate degree. Two more chills occurred, but no further abscesses. The gas was continued about three weeks, the doses being less frequent as the patient improved. At the end of that time, convalescence appeared to be established, and the oxygen was discontinued.

Whether in this case the gas exerted any influence upon the septic material in the blood, or whether its effect was merely stimulant and tonic, it is difficult to determine. It is certain, however, that a very remarkable improvement took place simultaneously with the administration of the gas, and which could be attributed to no other agency.

The prolonged contact of oxygen with a denuded surface produces a stimulating effect which varies in degree with the condition of the surface. In the case of recent wounds there is merely a sensation of warmth. In suppurating surfaces, the first effect is to render the granulations less florid and softer, and to increase the discharge. If the contact be too prolonged, however, or too frequently repeated, there will be a subsequent reaction so decided as to compel a suspension of the treatment. An analysis of the gas after prolonged contact with a denuded surface shows the presence of an abundance of carbonic acid and a considerable loss of oxygen.—*(Demarquay.)*

It does not appear that the local application of the gas possesses sufficient advantage over its use by inhalation to compensate for the difficulties attending it. Introduced into the blood, the action is more uniform and satisfactory, and less liable to become excessive. A transient contact, however, may be of use in cases in which the cutaneous capillaries have lost their tone, and passive hyperæmia is the result. The effect will then be to cause contraction of the vessels, and paleness will take the place of the previous congested hue. Demarquay has illustrated this admirably in a case of eczema rubrum.

CHAPTER VII.

CONCLUDING OBSERVATIONS.

The foregoing sketch is far from presenting a complete view of the therapeutical results which have been attained by the use of oxygen. Only those points have been brought forward which seem to be sustained by sufficient testimony to entitle them to serious consideration. Numerous isolated cases could be collected in which curative effects have been obtained in a wide range of affections. But enough has been adduced to show that in oxygen we have a remedy capable of aiding us more or less, under circumstances in which the usual resources of therapeutics are inadequate.

Occupying such a peculiar physiological relation to the system, it would be difficult to assign oxygen to any one class in a systematic nomenclature of the materia medica. Of its remote effects the tonic and alterative are the most prominent, while a new word must be coined to express its primary action in dyspnœa. Its local action is stimulant, but is appreciable only in diseased conditions of the surface to which it is applied.

A vast and inviting field for experiment is afforded by the possible

effect of oxygen in the whole family of diseases supposed to depend upon a toxic material in the blood. In some of these diseases good has already been accomplished by it. But its action in contagious affections, with the exception of cholera, has not yet been studied, and presents a tempting array of possibilities to stimulate investigation. Especially in New York City, where oxygen is now placed within the reach of every practitioner, and in a form entirely free from everything objectionable and troublesome, it is to be hoped that ere long its relations to disease will be as thoroughly studied as have been already its relations to the economy in health.

There is but one condition which may be considered as contraindicating the use of oxygen, and that is the presence of acute inflammation. But even to this, as we have already seen, there are exceptions. Indeed, it is, after all, a question whether we have any clinical proof whatever of this supposed incompatibility. We do not find in practice that good, pure air aggravates inflammation, nor that the severer forms of the affection select by preference those in whom hæmatosis is most perfect. It may well be, therefore, that this supposed contraindication will prove to be merely a fragment of the exploded idea, formerly entertained, as to the physiological action of the gas.

It is undeniable, however, that care should be exercised in the use of oxygen in cases in which there are solutions of continuity in the pulmonary mucous membrane. In such cases the local effect of the gas may be developed, and should be vigilantly watched for. The pulse and temperature will furnish the most reliable guides. But, by using the gas very largely diluted, allowing, for example, twenty or thirty minutes for the inhalation of three gallons, any local action will generally be avoided.

In practice, a great difference will be found in different persons, in the readiness with which the gas appears to be absorbed, and in the quantity required to produce a given effect. It is possible that this may be owing, at least in part, to the fact observed by Chevreul, that oxygen is more rapidly absorbed when the blood is more than usually alkaline. This suggests the propriety of using alkalies moderately in cases in which the oxygen does not seem to be easily absorbed, provided their use is not contraindicated. It is possible that, by their aid, oxygen might be used successfully when it would otherwise fail to produce the desired effect.

[*To be continued.*

NOTES.

The Late Dr. Hitchcock.

At a meeting of the Faculty of the Dental School of Harvard University, President Eliot presiding, the following resolutions were adopted, viz.:

Resolved, That the Faculty of the Dental School of Harvard University have been deeply grieved at the death of their Dean, Dr. Thomas Barnes Hitchcock, and in recognition of his character and services, deem it their duty to place on record their regret for his loss and their sense of his merit.

Resolved, That in him the Harvard Dental School has lost a valuable officer, whose unwearied and successful discharge of the duties of his Professorship, and unselfish interest in his work as Dean, entitle him to the respect and gratitude of all who are interested in the cause of Dental Education.

Resolved, That the Dean be directed to communicate a copy of these resolutions to the family of the deceased, with assurances of our sincere sympathy in their bereavement.

THOMAS H. CHANDLER, *Dean.*

The Late Dr. Hamlin.

Resolutions of Respect adopted by the Dentists of Nashville—A Biographical Sketch of the Deceased.

At 11 o'clock yesterday morning a meeting of the dentists of Nashville was called at the office of Dr. Ross, for the purpose of paying the last tribute of respect to the memory of Dr. T. B. Hamlin, who died Sunday morning at his home near Edgefield Junction.

Dr. Ross was appointed Chairman of the meeting and Dr. Noel Secretary.

A committee of three, composed of Drs. Morgan, King and Cobb, were appointed to draft suitable resolutions.

After a short consultation the committee presented the following, which were adopted:

Whereas, God in his Providence has taken to himself our highly esteemed friend and former colaborer, Theodore Burnam Hamlin, D. D. S., and believing the Almighty Father doeth all things well, and that his providences are always wise and good, we bow with humble submission to his divine will.

Resolved, That we here record our high appreciation of his character, both as a Christian gentleman and a professional man. And we would call to mind his marked energy of character, his concentration of purpose, and his lofty aspirations for perfection, as worthy of imitation.

Resolved, That we cherish the memory of his life, and especially of his professional life, and hold it up as worthy of imitation by our professional brethren.

Resolved, That in his death his family lose a kind and affectionate husband and father, his Church an upright, zealous member, and the Masonic Fraternity one of its brightest jewels. But our brother so lived that

> "When the summons came to join
> The innumerable caravan that moves
> To the mysterious realms, where each shall take
> His chamber in the silent halls of death,
> He went, not like the quarry slave, at night,
> Scourged to his dungeon, but, sustained and soothed
> By an unfaltering trust in God, he approached his grave
> Like one that draws the drapery of his couch
> About him, and lies down to pleasant dreams."

Resolved, That we will attend his funeral services in a body.

Resolved, That a copy of these proceed-

ings be sent to our daily papers for publication, and that a copy be furnished the family of the deceased.

Resolved, That a copy of these resolutions be furnished all the Dental Journals for publication.

Dr. Hamlin was born on June 24, 1810, in Windom, New York. He was left an orphan at an early age without means, and almost without friends or kindred. At eighteen years of age he was foreman in the largest watchmaker's establishment in Albany, and perhaps in the United States, where his attention was first directed to dentistry. He removed to Wytheville, Va., about 1834 or 1835. At this time we find him taking an active part in the organization of Dental Societies. He assisted in the organization of the Virginia Dental Society, the first of its kind in America or in the world, so far as is known to the profession. He removed to Tuscumbia, Ala., about the year 1845, and thence to Nashville in 1847, where he did a large business in connection with Dr. Morgan, until the close of 1858, at which time his health failed, and he went into the nursery business in connection with bee culture. In the latter business he was authority, having published a practical and highly-prized work on bee culture a few years since. He was also Vice President of the National Association of Apiarians at the time of his death.

Dr. Hamlin was a member of the Presbyterian Church and an ornament to the Masonic fraternity. He was a member of indomitable energy, and for him to conceive was to execute.—*Nashville Union*, May 26, 1874.

New Jersey State Dental Society.

The Fourth Annual Meeting of this Society was held at Mount Holly, on the 14th, 15th, and 16th of July, President J. W. Cosad, of Jersey City, in the chair.

The following officers were elected for the ensuing year.

President, Dr. George C. Brown, of Mount Holly.

Vice-President, Dr. R. V. Jenks, of Paterson.

Secretary, Dr. J. W. Scarborough, of Lambertville.

Treasurer, Dr. William H. Dibble, of Elizabeth.

Executive Committee, Dr. Worthington Pinney, of Newark; Dr. C. S. Stockton, of Newark; Dr. E. F. Hanks, of Jersey City; Dr. Chas. Dippold, of Trenton; Dr. James C. Clarke, of Jersey City.

Examining Board, Dr. C. S. Stockton, of Newark; Dr. J. Hayhurst, of Lambertville; Dr. Louis Reading, of Trenton; Dr. Edwin Chew, of Salem; Dr. Fred C. Barlow, of Jersey City.

Professors Truman and Barker, of Philadelphia, were present, and contributed much of interest and profit, in the discussions elicited by the reading of papers as follows:

Alveolar Abscess, by Dr. W. E. Pinkham. The Morrison Engine, by Dr. E. M. Beesley. Contour Fillings, by Dr. J. Chadsey. Dental Instruments and Appliances, by Dr. J. Hayhurst. The Inter-relation of Medicine and Dentistry, by Dr. S. E. Arms.

On motion, the Committee on Instruments and Appliances, Drs. E. F. Hanks, of Jersey City, C. S. Stockton and W. Pinney, of Newark, were continued.

On motion, it was decided to hold the next annual meeting at Long Branch, on the first Tuesday in July, 1875, instead of the second Tuesday, as heretofore.

Professor Truman delivered a very able and instructive address to the members and the citizens of the place, on Wednesday evening. After a brief and stirring address by the retiring President, the newly elected officers were installed, and the Society adjourned.

J. W. Scarborough,
Secretary.

THE
Morrison Dental Chair.

Price, $150.00. Boxing, $5.00. Spittoon Attachment, $8.00.

It possesses great superiority over any chair before offered to the profession, and is at the same time less expensive than any other first-class chair. Some of its points of superiority we here enumerate :

1st. All the advantages of any low-based chair, and also of any high-based chair, are here secured in a single chair. In it the patient can be placed lower than in the lowest-based chair made, or higher than in any other of which we have knowledge. At its lowest position the seat is fifteen inches, and at its highest position forty-two inches above the floor.

2d. The operator using the Morrison Chair can either stand or sit at his work, as he may choose, working with equal convenience in either position.

3d. It has been a very general complaint that dental chairs are too wide at the back, so holding the operator away from his work. Here this difficulty is overcome. The chair is narrow at the back, so that the operator need not stretch to reach the patient, but *can lower either arm of the chair out of the way* and so be as near the patient as he may choose.

4th. It can be changed from its lowest to its highest position in seven seconds—a celerity impossible in any chair raised by a screw.

5th. It can be very readily and perfectly adapted to operations on children of any age

First. Because in it the child can be raised as high as needed for the tallest operator.

Second. It provides a comfortable back and head rest, exactly as for grown persons.

Third. The footstool can be lengthened or shortened, to suit children of any size.

6th. The back of the chair can be lengthened or shortened rapidly and at will.

7th. The lower part of the back can be thrown forward to support the small of the patient's back.

8th. The chair, when adjusted to any position, is firm or steady wherever placed, and this is *especially true of the head-rest.*

9th. It occupies less room than any other operating chair.

10th. Although the footstool, when at its extreme length, is much longer than any other made, yet a person of ordinary weight can stand on its extremity without tipping the chair.

Nota Bene.—We have substituted brass cogs and castings, for those that experience has shown in any degree faulty, and the chair, *as now sold, is as strong as any chair made.* Reference is made to this because several of the chairs first sent out, failed in the cogs by which the chair is raised, and in the castings which throw the lower back-pad forward. These have been replaced in every instance with brass cogs, without charge on our part, and to the complete satisfaction of the purchaser.

We are gratified in being able to refer to the commendations, which follow, from some of the leading practitioners of the country.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

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10 W. 11*th St., New York, July* 24*th*, 1873.

MESSRS. JOHNSTON BROS., Broadway :

I find your Morrison Chair gives great satisfaction. My patients all admire, and voluntarily pronounce it the easiest they ever sat in. The movable back-piece, arms and foot-rest, which latter the patients can adjust at pleasure without changing their position, the lowering of the whole chair, which admits stepping into it without the slightest inconvenience, are points which call forth immediate praise from the patients, and give great satisfaction to the operator.

As a child's chair it is invaluable ; the little patients can be "put just where you want them," while the operator can with ease change the position of the *whole* chair, without disturbing the patient in the least. These points, combined with others which it has, make this chair the most desirable of any which I have seen. Very respectfully yours, A. L. NORTHROP.

JOHNSTON BROS., *Hartford, June,* 15*th*, 1873.

GENTLEMEN : I have used the new Morrison Chair several hours every day since its arrival here, and feel in duty bound to say that there is no chair manufactured that can compare with it.

Its adaptability to children as well as adults, support for the small of the back—in fact, all its motions are perfect, and I see no chance for improvement. Dr. Morrison and yourselves have my heartfelt thanks for the great benefits you have conferred upon the profession in perfecting the chair as well as the Dental Engine. Very truly yours, GEO. L. PARMELE, M.D., D.M.D.

MESSRS. JOHNSTON BROS., *Hartford, July* 24*th*, 1873.

DEAR SIRS : The Morrison Chair meets all my expectations. I like it very much ; in fact, I feel perfectly satisfied that I have one of the most complete chairs yet made for the comfort of patients and the convenience of the operator.

Yours truly, JAS. McMANUS.

JOHNSTON BROS. *Bloomington, Illinois, July 18th*, 1873.

I am well pleased with the Chair. Think it equal to anything that has ever come before the profession. Success to the inventor and manufacturer.

J. CAMPBELL.

MESSRS. JOHNSTON BROS., *Bennington, Vt., July 7th*, 1873.

GENTLEMEN : The Morrison Chair is the best I have ever used, and the most comfortable for patient or operator.

Yours truly, J. N. SCRANTON.

MESSRS. JOHNSTON BROS. *New York City, July* 25th, 1873.

GENTLEMEN : I deem it a pleasure to add my testimony as to the merits of the Morrison Chair. How can the intelligent dentist afford to be without it? Some of its merits are: The many comfortable positions in which the operator can place himself while operating, especially the low sitting posture; also the rapidity of movement and quick adjustment of the essential positions of the Chair, and a very comfortable seat for the patient during an operation. The Chair itself is a beauty; thanks to the *inventor* and *manufacturer*, we now have a trinity in the dental world; *the Liquid Gas, the Morrison Engine, and the Morrison Chair.*

Respectfully, C. BURNSIDE STODDARD.

MESSRS. JOHNSTON BROS. 28 *East* 13*th St., New York, July* 24*th*, 1873.

GENTLEMEN : In reply to your request for the opinion I have of the Morrison Chair, after a few weeks' use, I can say, first of all, that it is the easiest Chair to work over I have ever used; and not only for the operator, but also for the patient. The adjustment of the parts, after a little familiarity, is most rapidly accomplished to suit almost any whim of either doctor or patient. There is a facility in bringing yourself and your patient into harmonious working relations, which can be understood only in its use. It is not necessary to speak in detail of its parts, which are familiar to all—only of the foot-rest, which seems most intractable of all, I have found perfectly convenient for all classes of patients. Wishing you success commensurate with your merits,

I am very truly yours, W. A. BRONSON, M. D.

MESSRS. JOHNSTON BROS. *Norwalk, Connecticut, July* 24*th*, 1873.

DEAR SIRS : In reply to your note of yesterday I would state that one thousand dollars would be no inducement for me to part with the Morrison Chair if I could not replace it. My patients are unaminous in their praises of the Chair, and all wish that they had one at home. I know of no greater praise or recommendation than that, that could be bestowed on any chair.

Yours in haste, THEO. E. SWIFT.

MESSRS. JOHNSTON BROS. *Lee, Mass., July* 26*th*, 1873.

DEAR SIRS : I am using the Morrison Chair, and find that it meets every requirement for comfort to myself and patients. It gives me pleasure to say that I consider it a perfect Chair. It has been regarded with uniform admiration by all who have examined it.

Very truly yours, H. H. FITCH.

MESSRS. JOHNSTON BROS. *Hartford, July* 25*th*, 1873.

DEAR SIRS : The "Morrison Chair" I consider the best, most convenient, and in all respects the easiest to adjust for dental operations, of any I ever used.

Yours truly, JOHN CODY.

MESSRS. JOHNSTON BROS. *Wooster, Ohio, April* 24*th*, 1874.

GENTS : I received your Chair, and am *well* pleased. Have used it for one month and cannot find an imperfection in it. So far as my experience has led me, there is not a requirement of an Operating Chair that it does not possess. I would not exchange it for any chair now manufactured.

Yours with respect, C. B. MOWER.

REMODELED
Morrison Dental Engine.

NEW YORK, May 25, 1874.

JOHNSTON BROTHERS.

GENTLEMEN:—You ask my opinion of the Remodeled Engine:

I have now used mine two weeks, and would say that its advantages to the operator over the old style are nearly as obvious as were those of the first Engine over hand work.

JOHN T. METCALF.

The cut on the following page well illustrates the new Engine, and, with the subjoined description, will make the alterations plain to all.

DESCRIPTION.

1st. The rocking movement of the upright standard is abandoned, and a rigid, handsomely plated, and tapering column substituted.

2d. From the top of this column extends an arm directly in front of the patient. This arm swivels upon the column, and is adjustable vertically, being secured by a brace at any height desired, thus bringing its end directly in front of the patient's mouth, whatever be the height of the operating chair.

3d. Attached to the end of the adjustable arm by a most ingenious universal joint, is a shaft about twelve inches long (corresponding to the extension arm of the old engine), which carries at its end the handpiece.

a. This shaft, being short, is much lighter than the old one, enabling the operator more perfectly to feel his work, and is also less liable to tremor.

b. Both sides of the mouth may be reached without changing the position of the engine.

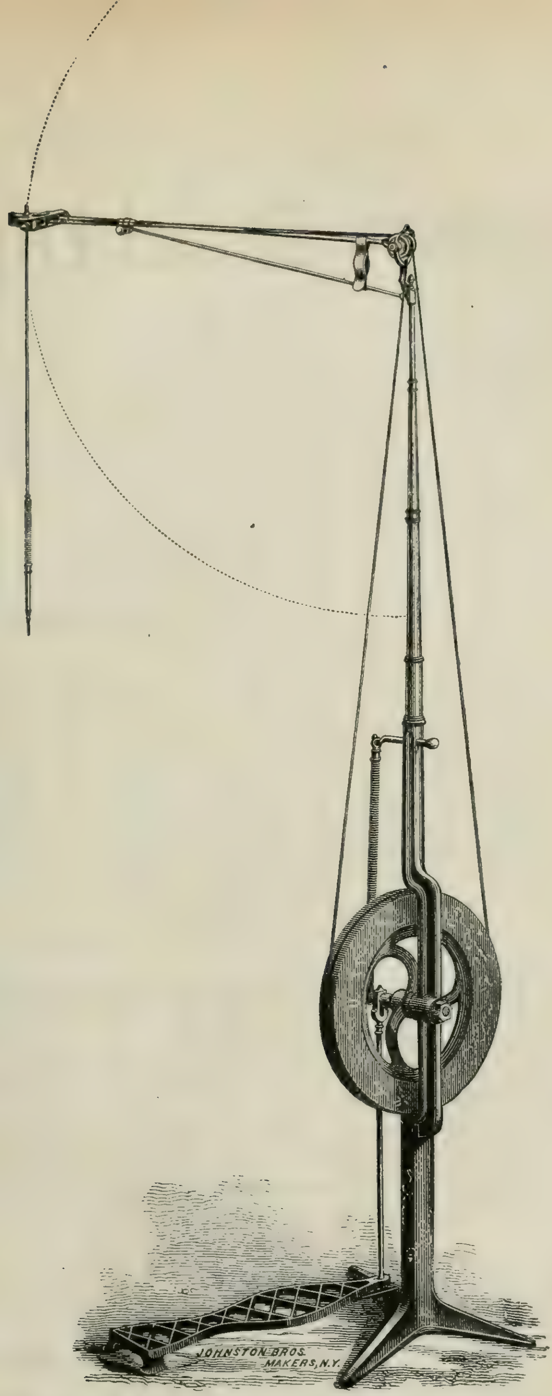
c. By lowering or raising the adjustable arm, according as the operation is upon the superior or inferior teeth, the driving spring is but slightly flexed, and great steadiness secured.

4th. The off-centre spring is attached above the driving wheel, partially supporting it and reducing the friction.

5th. The handpiece is much smaller, and the burs so secured that they may revolve in either direction, and at the same time be used either with a pushing or pulling cut, and this without the use of a catch spring. Old style burs can be refitted to this handpiece.

The model engine of this pattern, as above described, has been for several weeks in use in the hands of one of the best operators in our city, and is pronounced by him a very decided improvement.

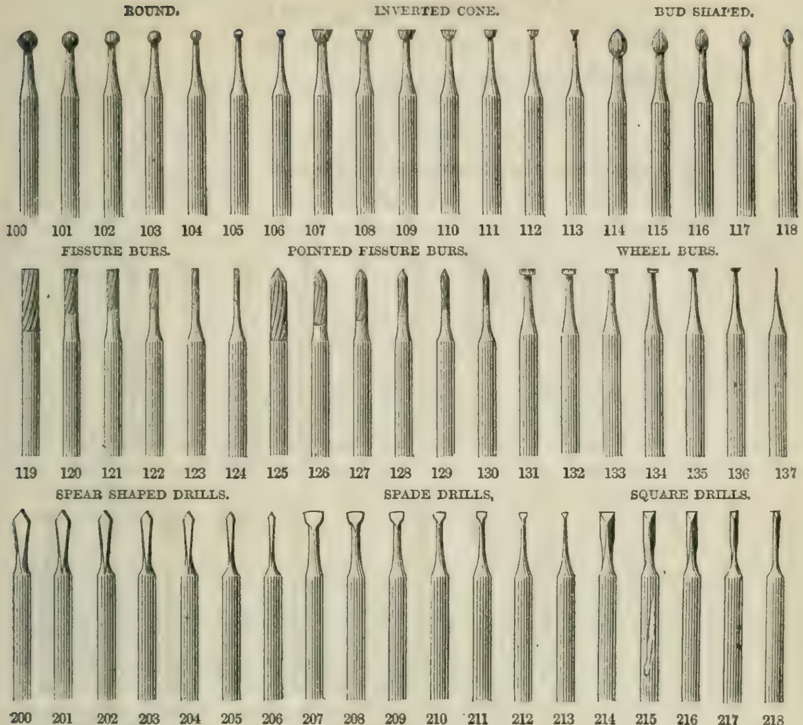
JOHNSTON BROS.

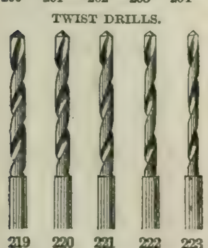


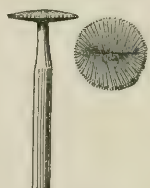
REMODELED MORRISON ENGINE.

Price, $60. Right Angle Attachment, $5. Boxing, $2.

CAVITY INSTRUMENTS.







Price, $1.25.

CAVITY INSTRUMENTS FOR RIGHT ANGLE ATTACHMENT.

We have in stock, and can furnish *Cavity Instruments* for the *Right Angle Attachment*, of all styles and sizes, from Nos. 100 to 218, inclusive.

SCOTCH STONES, MOUNTED.

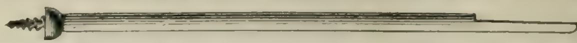
The Scotch Stones enable the operator to give a finish to fillings hitherto unattainable, and only need a trial to be appreciated. We have these in stock of forms Nos. 75, 77, 80 and round. Other kinds of stones are now in process of manufacture.

HINDOOSTAN STONES, MOUNTED.

Forms of Nos. 75, 77, 80, and round. Of each shape we make three sizes. The cuts referred to by the numbers represent the large size. These are, beyond doubt, of the greatest utility in cutting either gold or bone. They last longer than any other stone.

LEATHERS, MOUNTED.

We have in stock Leather Points mounted on Mandrils, of forms Nos. 75, 77, 80 and round, designed to be charged with powders, for polishing and finishing fillings.



Screw Mandril. to be armed with leather, wood, etc., for polishing fillings, cleaning teeth, finishing plates, etc.

PRICES.

Finishing Burs,	Per dozen,	$6 00
Stoned Finishing Burs,	Each,	1 00
Cavity Instruments and Screw Mandril,	Per dozen,	3 00
Stoned Cavity Burs,	Each,	50
Right Angle Cavity Instruments,	Per dozen,	3 00
Leathers, Mounted,	"	3 00
Hindoostan Stones, Mounted,	"	6 00
Scotch Stones, Mounted,	"	3 60
Burnishers,	"	9 00
"	Each,	0 75
Corundum Points, Mounted,	Per dozen,	1 50
" " not Mounted,	"	0 75
Bands for Engine,	"	1 50
Twist Drills	Each,	40

IN ORDERING INSTRUMENTS, DESIGNATE THEM BY THEIR NUMBERS, AND STATE WHETHER THEY ARE WANTED TO FIT THE (A,) (B,) OR (C) HAND-PIECE.

Hand Piece, Style A.

Hand Piece, Style B.

Hand Piece, Style C.

We can alter A or B burs to style C, at 25 cents per dozen.

When sending burs by merchandise mail for alteration or repair, attach your *card* or *printed address* to the outside of the package—do not write it. Send at same time a letter containing your count of the burs, and directing the disposition you wish made of them.

☞ Our instruments are all made of the best Stubs' steel. We shall spare no effort to make them equal in every respect to anything offered to the profession.

☞ We are constantly adding new forms and sizes of Plug Finishing Burs, Cavity Instruments, Drills, etc.

DIRECTIONS FOR USING THE ENGINE.

1. In lifting the engine, be sure *not to bend* the arm which carries the hand piece.

2. Whenever the least noise is heard, oil the engine with the best sperm oil. The rapidity of motion renders oil a necessity.

3. The only part at all likely to break, is the small spring, which conveys power at the upper end of the hand piece. It is not soldered to the shaft, but is slipped on by hand. To put on a new spring, take hold of it near the end opposite that you apply to the shaft, and twist as if to *uncoil* the spring, at the same time pushing the spring on to the shaft. You will be greatly aided in removing the broken parts, by twisting, as if to uncoil, the spring. A piece of emory paper will be found convenient to aid in holding the polished shaft.

4. The engine, to run satisfactorily, should be oiled daily ; and the driving-spring should be perfectly straight.

IMPROVED INSTRUMENTS.

WE HAVE ADDED to our list three new and very popular sizes of Cavity Burs. One round called 106½, one inverted cone called 113½, one wheel-shaped called 137½. Each is smaller than any before made by us, of its shape. These numbers are neatly put up in dozen and half dozen packages, and are completely protected from oxidation and from rubbing against each other in transportation.

They are very popular, and we frequently receive orders from dentists for from one to three dozen of each.

STONED BURS FOR BURRING ENGINES.—For some time past, we have made to order, a Bur for use in Burring Engines, by the following process: The teeth of the Bur being laid out with extreme accuracy, are filed to *exactly the same length,* but are not brought to a cutting edge. The Bur is now tempered, and each tooth *afterwards stoned to a fine edge.* This secures a Bur perfect in all its cutting edges, and unequaled by anything hitherto offered in the market. Of these we are provided with a limited supply, of both Cavity and Finishing Burs, excepting Fissure *Burs.* (See Price List.)

THIN BOXWOOD DISCS for carrying Polishing Powder, to polish fillings in proximal cavities. These are of four sizes, from ⅜ inch to 1 inch diameter.

WE ADD THAT THE INSTRUMENT-STAND, elsewhere illustrated, will be found very useful for the convenient keeping of the Engine Instruments while not in actual use.

Besides the form represented in the cut, we have them with smaller holes, and very many more of them, so that each Bur may be kept by itself.

WE INVITE the fullest examination of our Engine Instruments, as regards

The quality of the steel from which they are made.

The shape and finish of the cutting edge.

Their temper.

The rapidity with which they cut.

Their durability.

The shaft of each instrument is *round and highly finished,* and can therefore be used without unreasonable and unnecessary injury to the nose of the hand-piece, which injury occasions unsteadiness in all the uses of the Engine.

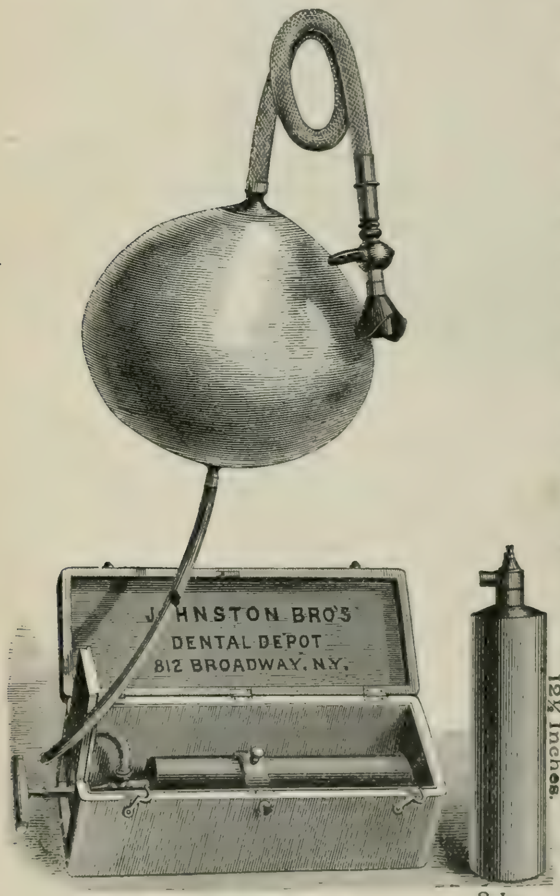
They will *bear* examination in *quality* and *price.*

JOHNSTON BROS.

LIQUID NITROUS OXIDE.

[Revised Circular.]

The increased and still increasing demand for Pure Liquid Nitrous Oxide, and for information concerning apparatus for its exhibition, renders it necessary that we issue yet another edition of our circular upon that subject As the Surgeon's Case, as first introduced, has proved itself in every way all that we could wish it to be for the place assigned to it, we cannot do better than to repeat here our first description of it.



SURGEON'S CASE.

This comprises a strong cylinder containing One Hundred Gallons of Gas; a strong morocco covered case, provided with an iron ring and set screw, by which the iron cylinder is held in place during use, and its delicate valve protected from injury; also, a rubber bag with rubber tube at one end for admission of gas, while an inhaling tube, handsomely covered on its outside, and provided against any possibility of a collapse by a tin-coated spiral of wire on its inside, is fastened at its opposite end—an inhaler—a nickel-plated wrench and a nickel-plated key. In fact, *all* the apparatus necessary for administering the gas. The whole case and contents weighs about fifteen pounds. This is here shown as open, and the bag which receives the gas from the cylinder, and from which it is exhibited to the patient, is represented as filled, and suspended above the case. The cylinder is also shown as standing at the side of the case. This is the simplest and most popular form of apparatus, and will be everywhere welcomed —because of its portability for use outside of the operating room.

REVISED PRICES.

Complete Apparatus — Surgeon's Case, with Metallic Inhaler. . . . . **No. 1.**	$42 00
Complete Apparatus—Surgeon's Case, with extra sized Bag and Metallic Inhaler. . . . . **No. 2.**	45 00

Boxing either, $1.00.

Each complete apparatus includes a 100 gallon cylinder, filled with Liquid Nitrous Oxide.

Cylinder with 100 gallons of Gas.	16 00
Refilling Cylinder.	6 00
Morocco covered case, with ring and thumb screw, velvet lined,	12 00
Polished bl'k walnut " " " " "	13 00

Of these latter we have only a limited number.

Rubber Bag, with covered inhaler tubing. (about 4 gall. capacity)	5 00
Rubber Bag, with covered inhaler tubing, extra size.	7 00
Inhaler, with spring valves, trumpet mouth-piece, with Plated connection.	8 50
Inhaler, latest style, with two way stop cock, adapted to the use of both dentists and surgeons, with connection.	9 50
Key, Nickel Plated.	1 50
Wrench, "	50
Union, Nickel Plated, (nut and tube), for connecting cylinder and gas bag.	1 50
Covered Inhaler Tubing, per foot.	50
Plated Connection to fit old style Inhaler.	1 00

REMARKS.

When the side of a bag has been perforated, it cannot be repaired, but should be replaced. Send on the tubing by mail, and the bag will be replaced. Price.	3 00

As this cannot be done *properly* except by the use of rubber cement, and by persons experienced in the business, we think it every way advisable that it be entrusted to the rubber workers, and not attempted by the dentist.

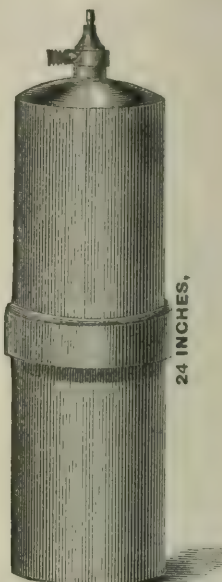
JOHNSTON BROS.,

812 BROADWAY, N. Y.

ONE THOUSAND (1000) GALLONS GAS,

LIQUID NITROUS OXIDE.

1000 GALLON CYLINDER CASE.
Price, $30.00. Boxing, $2.00.



1000 GALLON
CYLINDER.
Price, $36.00.
Boxing, $1.50.

Gas in 1000 gallon lots, 4½ cents per gallon.

The above illustrated apparatus is especially desirable where large quantities of nitrous oxide are used, or where it must be sent a great distance. In this form it is best to ship it by *fast freight*—which makes the cost of transportation very light.

THE GAS CAN BE KEPT FOR ANY LENGTH OF TIME,

AND IS

CONSTANTLY ON HAND AND ALWAYS OF THE BEST QUALITY

PRICE LIST OF A COMPLETE OUTFIT.

1 Black Walnut Paneled Case, octagonal	$30 00
2 1000 gallon Cylinders at $36 00	72 00
2000 gallons of Gas at 4½ cents per gallon, being 25 per cent. less than price in small cylinders	90 00
1 Bag, with covered Inhaler Tubing	5 00
1 Bag, extra size, with covered Inhaler Tubing	7 00
1 Key, Nickel Plated	1 50
1 Wrench, Nickel Plated	50
1 Union, " "	1 50
1 Inhaler—Metallic—with two way stop cock and connection	9 50
	$217 00
Deduct Gas	90 00
Cost of Apparatus	$127 00

By purchasing under this plan a saving of 25 per cent. is effected in the cost of the gas, or on 2,000 gallons of $30.00.

It is right that we should here announce that we have in hand a piece of furniture, which—while it will answer the purpose of the black walnut case illustrated—will also serve as a stand for an ornamental Gasometer.

A cut of it will appear in an early issue of the Dental Miscellany.

As these large cylinders can easily be sent by fast freight (*the* 100 *gallon size is too small to be so risked*) cost of transportation is reduced to its lowest rate.

JOHNSTON BROTHERS,

812 Broadway, New York.

PORCELAIN TEETH.

Our stock is carefully selected from the factories of the BEST MAKERS, and embraces all of the varieties in use, including Continuous Gum Teeth. We will fill orders on short notice for any manufacture of teeth.

Dentists sending us their orders can rely on receiving prompt attention, and on getting manufacturers' best rates.

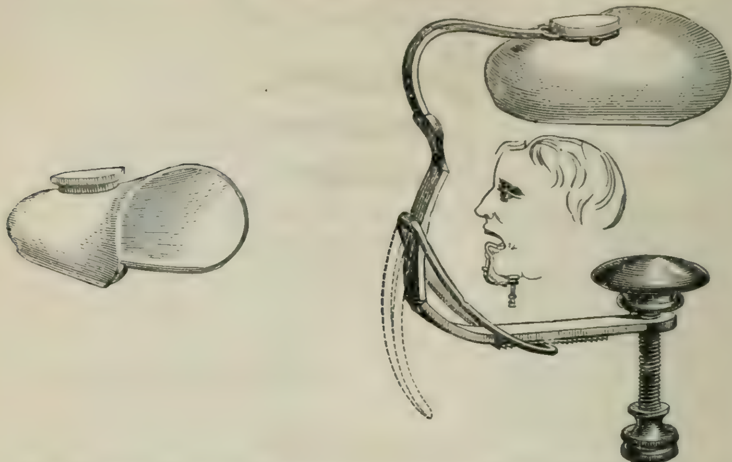
JOHNSTON BROTHERS.

DENTAL GUM—RED.

Johnston Bros.' Nos. 1 and 2, per lb	$2 50
E. Dougherty's Nos. 1 and 2, per lb	2 75
American Hard Rubber Company's, per lb	2 50
Whalebone Rubber, per lb	3 50
Dental Gum—black—per lb	3 00
Gutta Percha, per lb	3 00

JOHNSTON BROTHERS.

OSBORN'S TONGUE HOLDER.



Osborn's Tongue Holder and Duct Compressor. Is Cleanly, and Reflects Light in the Mouth.

This is by far the best Tongue Holder and Duct Compressor ever offered to the profession. The cut exhibits one adjusted as when in the mouth, also a view of one in use.

It possesses the following advantages, in addition to those of other apparatus designed for the same purpose.

1st. It covers the tongue, and so completely protects it from accident, while at the same time permitting to the patient some chance for changing its position *inside of the cup.*

2d. The cup which covers the tongue being of the finest white porcelain, *reflects light in the mouth*, and so *greatly* aids the operator.

3d. The cups can be readily and perfectly washed, and the use of the apparatus is therefore far less objectionable to the patient than is that of the ordinary metallic tongue holder.

4th. This apparatus is so readily applied that it is often used when the application of rubber dam would be difficult, or require considerable time. The cup pressing upon a pledget of spunk or bibulous paper nicely placed upon the ducts effectually prevents the flow of saliva.

It is recommended by Drs. William H. Allen, W. C., Bennett, and Frank Abbott, of New York city, and C. Fones, of Bridgeport, Conn.

PRICES.

Complete, with three porcelain cups	$10 00
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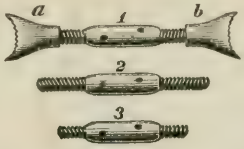
Devised by Dr. C. S. LONGSTREET, with Dr. A. McCOLLOM'S Improved Head.



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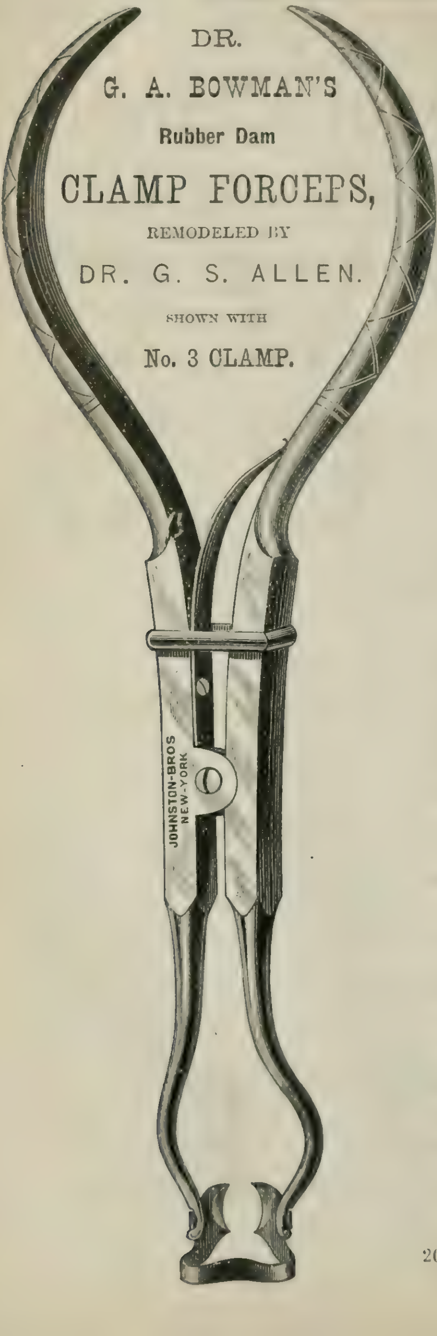
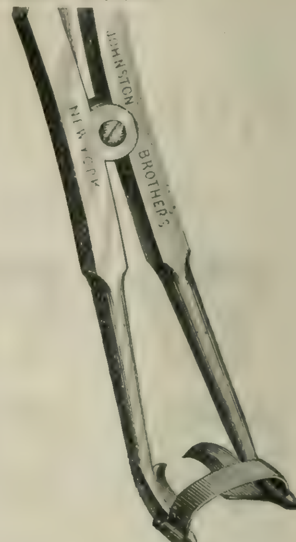
Of these we offer two styles, both deservedly popular.





POINTS OF DR. T. C. ROYCE'S

Rubber Dam Clamp Forceps,

Shown with Clamp. Handles are exactly like the other style, (Bowman's.)

Both styles of these Forceps have points accurately adapted to the shape of the clamp at the neck, and hence will be found much more convenient than those hitherto offered the profession in this point of adaptation. (See also advertisement of Clamps.)

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PRICES.

Forcep, either style	$3.00
" " " Nickel Plated	3.50
Complete set of Clamps, embracing eight forms	4.00
Complete set of Clamps, embracing eight forms, plated	4.80
Clamps, each	50
" " plated	60

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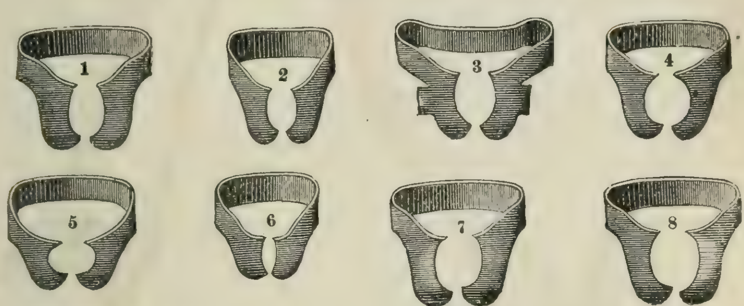
We were never more sure of doing signal service to the Dental Profession than now in offering the

IMPROVED

Rubber Dam Clamps,

INVENTION OF

DR. DELOS PALMER, OF NEW YORK.



Price, set of Eight, { Oil finish, $4.00. Each plain, 50 Cents.
Nickel plated, 4.80. " Nickeled, 60

For use with Rubber Dam Clamp Forceps.

These Clamps are designed to be placed on the tooth at the commencement of the operation. Afterwards apply the Rubber Dam by passing it over both tooth and clamp.

DESCRIPTION.

Nos. 1 and 2.—Universal Clamp for Molars.

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No. 4.—For third molars, or any molar of a cone shape. This Clamp can oftentimes be turned around while on the tooth, so as to place the bow of the Clamp out of the way of the operator.

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Cuts of two favorite styles of Rubber Dam Clamp Forceps will be found on another page.

These Clamps have prominent points of marked superiority over those of other manufacturers.

First. Each has been carefully adapted to the shape of the tooth for which it is designed, *under the personal supervision of Dr. Delos Palmer*, the inventor.

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Dental Department.

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1874-75.

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JOHNSTONS'

Dental Miscellany.

Vol. I.——*OCTOBER*, *1874*.——No. 10.

IRREGULARITIES.

(*Continued.*)

By Norman W. Kingsley, M.D.S., D.D.S.

The present paper will be devoted not so much to the treatment as an inquiry into the causes of such forms of irregular dental development as have been considered in the preceding numbers. This peculiar conformation has recently attracted much attention, firstly through a contribution to the Odontological Society of Great Britain from Dr. Langdon Down, who had made an examination of a large number of feeble-minded youth, and was "satisfied that there was always narrowing betwen the posterior bicuspids of the two sides, and inordinate vaulting of the palate; the only exceptions being certain macro-cephalic idiots, in whom the mouth, like the rest of the cranium, was on a very large scale. So constant was this form of contraction, that Dr. Down relies upon it as a very valuable diagnostic character for distinguishing the congenital idiot from one who has become idiotic in consequence of morbid changes ensuing at a later period." And secondly, Mr. C. S. Tomes, assuming that Dr. Down is not mistaken in his observations, has put forth a most ingenious theory "On the Developmental Origin of the V-Shaped Contracted Maxilla," showing its correlation to congenital idiocy.

Being attracted particularly to these papers by the distinguished authority from which they emanated, and by the fact that a number of such cases had come into my private practice for treatment, I undertook an inquiry into all the accompanying history of each patient, that might serve to throw any light upon the subject.

In the cases of the two sisters which were described in preceding numbers, there was unmistakable narrowing of the arch at the point referred to by the aforenamed authors. But I could obtain no evidence that such contraction had a congenital origin. There was certainly not the slightest evidence of idiocy, either congenital or acquired.

In a former paper I stated that there was an hereditary taint, although it did not show itself in either parent, but this hereditary tendency does not show itself in the deciduous teeth. As I read Mr. Tomes' argument, he claims that in such cases there is or must be a contraction of the arch before the eruption of the permanent set. It is upon this assumption that he explains the bent line of the arch outward and backward from that point.

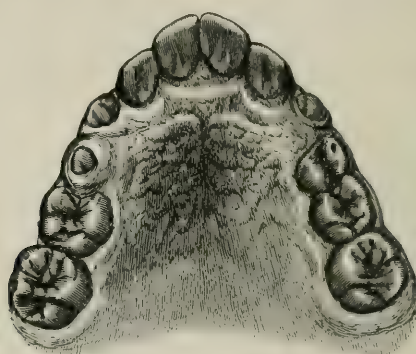


FIG. 1.

I have examined a large number of children in looking for a pinched or contracted dental arch, and unless associated with some other deformity, have never seen one. I have no reason, therefore, for believing that any considerable percentage of these cases which come to notice later in life, had a congenital origin. I am the more confirmed in this view by an examination into the condition of two younger brothers of the two sisters whose cases we have been considering.

Fig. 1 shows the upper jaw of the elder of the brothers, now eleven years of age. Both deciduous molars on the left side are remaining; on the right side one has been removed, and the first bicuspid is emerging from the gum; the second deciduous molar remains. The incisors, as seen in the cast, are permanent, and the canines are developing normally, one of them being through the gum, and the other nearly so. The reader will observe that the incisors have already assumed the V

shape which characterized the sisters'. They are now half an inch in advance of the incisors of the lower jaw. As will be seen, there is no want of space shown as an explanation of their prominence ; there is room enough in the arch for all the teeth that are there or are coming ; nevertheless, the arch is abnormally shaped, and will require sooner or later appliances for its reduction.

The lad has never contracted the thumb-sucking habit, and his mental and physical development are good. If the assumption was correct in regard to the inherited origin of the deformity in the two elder sisters, we need look no further for the cause of a like arrangement in the teeth of the brother. Reflection would also lead us to expect such a development in other members of the same family, on arriving at the proper age. But an examination of the mouth of another sister, now about fourteen years of age, shows a perfectly regular and symmetrical dental arch. A younger lad of about six years shows only the deciduous teeth and permanent molars of that age, and all regularly developed, with no symptoms of a tendency to a contraction of the arch to a V shape.

From these observations as well as others, I come to the conclusion that an irregular dental development cannot be prognosticated, even with a strong hereditary tendency, and particularly that form which assumes the V shape. Neither is this shape any evidence of idiocy or any tendency to idiocy.

In this connection I am impressed with the untenable ground taken by Dr. Barker at a meeting of the Alumni of the Pennsylvania College of Dental Surgery, as reported in the *Dental Cosmos* for May of the current year. "Dr. Barker brought before the Association a patient who had a strong hereditary tendency to a large projecting superior maxilla, and said : This tendency I overcame by extracting two perfectly sound six-year molars. There would be no such thing as irregularity, if the dentist could get the child young enough."

Prof. Truman asked : "Was the protrusion mentioned an existing fact, or was it only anticipated ?"

Dr. Barker replies that : The tendency was anticipated, and Prof. Truman most justly adds : "As there was no irregularity to treat in this case, I cannot discover any justifiable reason for the removal of the first permanent molars. In this patient, the articulation of the anterior teeth is perfect, while the proper articulation of the bicuspids has been destroyed by the extraction. The masticating surfaces of these teeth strike directly upon each other, producing, in my judgment, a serious irregularity."

These observations, made by Prof. Truman, of the results of an attempt to correct a protruding jaw which had not yet developed, together with the impossibility of foretelling what will be the results of an hereditary tendency, show the folly of any such experiments.

In the case of the family referred to in this paper, two daughters

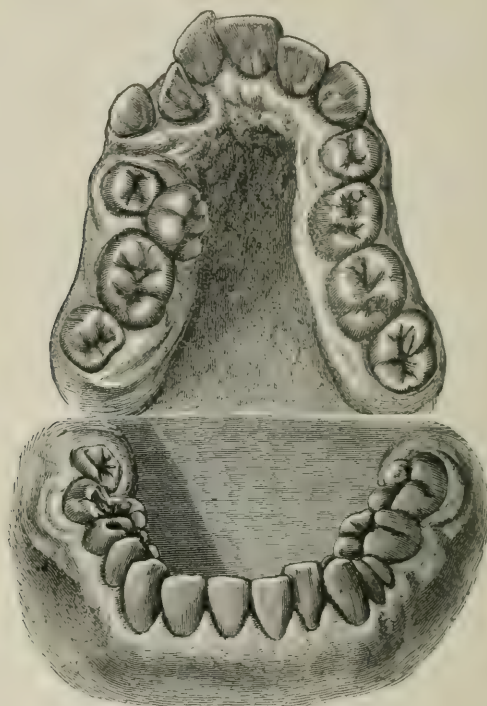


FIG. 2.

developed narrow arches and protruding jaws through an hereditary taint. The third child was passed entirely; the fourth is unquestionably following abnormally, and the fifth is too young to form a decision as to the permanent teeth.

Fig. 2 shows the models of a case I have now under treatment. The patient is of German birth, fifteen years of age, and above the average in height.

She is fair of face and comely appearance, there is no external appearance to suggest the internal deformity. The natural contour of

the cheeks is not disturbed. It is evidently confined to the alveolar processes and the teeth. I have seen other members of the family, and as yet discover no signs of hereditary transmission. It is not associated with enlarged tonsils ; the tonsils are not quite up to the average size.

In intelligence she is quite equal, if not superior to the average of the class in society to which she belongs. If I have not in this case as yet fully satisfied myself as to the origin of its peculiarities, I have made some approach to it by a process of elimination.

The teeth, it will be observed, are very irregularly placed, the second deciduous molars are remaining, and the second bicuspids have not erupted in the upper jaw. The palatine arch is the narrowest that I think I ever saw in an adult.

The width between the remaining deciduous molars across the arch is exactly one half inch, while in length the jaw would indicate a size above the average. The lower jaw articulates with the upper, but in such a way as to leave more room for the tongue below than above.

I propose to widen these jaws to the extent that harmony with the other features demands, and to that end have extracted the deciduous molar of the right side, and inserted a vulcanite plate with a jackscrew reaching from side to side, as illustrated in former articles.

The progress thus far has been both rapid and satisfactory, but no attempt is being made to accomplish it against time.

NEW YORK ODONTOLOGICAL SOCIETY.

Regular meeting of the Society held at the residence of Dr. R. M. Gage, June 19th, 1874. Minutes of the last meeting read and approved.

Dr. Perry : A lad was recently brought to my office, who some time previously had received a blow, breaking off a corner of the right superior central incisor, and causing the death of the pulp. The tooth had become discolored, and was exceedingly sore ; the gums inflamed and swollen. I treated the case by passing a lance through the gum, and with a syringe inserted into the opening in the crown, cleansed thoroughly, forcing water through the root and out of the opening in the gum. At this stage a swelling appeared under the chin of the boy, and his physician ordered him into the country, without my having an opportunity to fill thoroughly, the tooth being yet somewhat sore,

although not nearly as much so as when I first saw the lad. The root I filled temporarily with cotton and creosote, and the crown with gutta percha.

On the lad's return, the swelling under the chin had subsided, there was no pain in the tooth, and the opening in the gum had healed. Removing the temporary filling from the crown and root, I cleansed as thoroughly as possible, and filled the root permanently, and the crown for the time being.

The tooth at once became sore again, and the swelling under the chin reappeared. The parents became alarmed on account of the swelling, and, backed by the physician, urged the extraction of the tooth. I argued that there was no connection between the tooth and the swelling, that the tooth was a very valuable one, and that it might be saved. The tooth, notwithstanding my best efforts, became sorer, the swelling under the chin worse, and at last, wearied by ill success and the importunities of the parents, I extracted the tooth. My mode of treatment in this case may be open to criticism, and I hope the Society will discuss it thoroughly, particularly the use of cold water as a means of cleansing the root of a tooth prior to filling.

Dr. Frank Abbott : It has been my practice to cleanse thoroughly by syringing, as early as possible, and then to use a weak solution of carbolic acid, and after that, filling the tooth immediately. I always want an opening through the gum if I can get it, and I force the medicine through with a piston or syringe. Sometimes a syringe will not force the water through, when a piston will. In using a syringe, I take a bit of rubber and force it against the tooth in such a way as to prevent regurgitation as much as I can. Very frequently even this will not answer, but I am almost always successful with the piston.

There is a class of teeth, though, that it is quite impossible to succeed with by this treatment. Where the canals are very much compressed, I take a small piece of wax, and place it over the cavity, having first filled it with medicine, sealing up the orifice entirely; I then, with my finger, press it into the cavity, and with a burnisher flatten it down until I force all the liquid I can into the canal.

Usually the first or second trial will succeed. The moment I am assured that I have cleansed the canals, I fill them up immediately, and always prefer to fill them before the opening in the gum heals.

I had a difficult, though interesting case recently, of having to replace the fractured corners of two incisor teeth for a lady who would not have them built out with gold. She wanted something the color of the

teeth. I tried pieces of teeth, fastening them the best I could with screws set in cement. She invariably broke them off. After repeated experiments of this kind I fitted two pieces of platinum to the palatine surface of the remaining portion of the crown, had them enameled, and fastened them by screws to the natural tooth.

They have proved durable, and make a very presentable appearance.

Dr. C. P. Fitch : I think that injecting water through the tooth and through the gum is correct practice. Still I think Dr. Perry ought not to have extracted that tooth. He might have braved fate by keeping it in. I recollect two teeth in the very same condition. They were broken off and the pulp died, and gave me considerable trouble ; afterwards I took out the dead pulp, and they are perfectly healthy teeth now. They were in both cases in boys' mouths, ten to twelve years old. I wanted to keep the teeth there in order to prevent the central and lateral incisors from coming together and contracting the space ; so that, when the boy grew up, there might be a tooth inserted by means of a pivot on that root.

Of course it is a very unpleasant thing, when a parent or guardian wants a tooth out, to oppose them.

Dr. W. H. Atkinson : I am exceedingly pained to see how we ignore principles in almost all cases of diagnoses we attempt, and how utterly we vindicate the damnable things that are said of us, as not being fit to be recognized as specialists in medicine ; and when it comes from men less prepared than we are to decide about the case ; when medical men take hold of these cases that ought to be remanded to a special practitioner, I am fighting mad, and all in a turmoil of disturbed affection.

Now the nature of the case under discussion is evidently a constitutional disturbance ; because, if not, it would have healed in the first instance. Undoubtedly that child was not of a full vigorous condition at the time. That soreness below could, however, have no immediate connection with the tooth ; could not have been connected with it except through the general circulation. There is no direct communication between the sub-lingual and circulating glands.

I want to endorse absolutely in regard to filling the tooth at the earliest possible moment. If the pulp is dead, then remove it, and make the canal just as clean as you can ; but I do not advocate pure water for dressing a fresh or an old wound, but salt and water. When you fill the root of a tooth, fill it as tightly as possible, and when filled, never take it out. Dentists convict themselves by not understanding

the anatomy of the jaw. Do not be afraid of making a hole big enough, if you have to do it with a bur. You are over-timid. We are claiming to be surgeons, and claiming to be medical men, and yet trembling with the utmost childlike hesitancy about doing the thing we ought.

Nature never goes wrong; it is our misapprehension when we have made false diagnoses. Nature is a unity, and law is truth always. Our assumption that we understand law is what baffles us, and injures patients and profession.

Dr. N. W. Kingsley reported the continued success of the appliance exhibited and described at the last meeting of the Society, for the support of the nose and the restoration of the lost palate and teeth of a young lady.

Dr. W. H. Dwinnelle reported having a number of small pieces of cork made larger at each end than in the middle, ready for use in case of accidental puncture of the rubber dam.

Drs. R. M. Gage, A. C. Hawes, A. H. Brockway and Wm. Jarvie, Jr., were elected delegates to the American Dental Association.

Adjourned. WM. JARVIE, Jr.,
Recording Secretary.

CHEMICAL VERSUS GALVANIC ACTION ON THE TEETH.

By THOMAS FLETCHER, Warrington, England.

In a paper read by Dr. Palmer, before the N. Y. State Dental Society, in June last, some experiments are given with relation to the galvanic action supposed to exist as an agent of destruction to teeth which are plugged with different materials.

Having gone over very similar ground, and with results totally different to those stated, it will be well to give the other side of the question, to enable operators to judge and also to test the matter for themselves. That there is a distinct action visible in a delicate astatic galvanometer between a plug of any material and the tooth, may be granted; also, there is an appreciable current to be obtained from almost any two different substances, living or dead; but I think it will be an easy matter to prove that this current in itself is no proof of destructive action going on under practical conditions. We will first take a tooth with a practically and theoretically perfect gold plug. Any

operator will acknowledge that this is a safe protection, and that it will stand unchanged under ordinary conditions for an unlimited number of years. As this battery (as Dr. Palmer would call it) is fully exposed to the action of the saliva, acid or alkaline food, &c., it ought to result, on his theory, in the destruction of the tooth; in fact, the destruction ought to be greater the more perfect the contact of the filling. Where the plug is *not* in contact with the walls, no destruction should take place. The experience of every operator will enable us to dismiss this for the present.

With regard to tin, the galvanic action is given as less, and therefore the filling is safer, even if more imperfect. May we not rather say that tin being a much more plastic material, is, as a rule, better adapted to the walls of the cavity, and therefore keeps food and moisture out better than the ordinary run of gold plugs as inserted. The proof, however, I think, lies in the statements with regard to amalgams, which Dr. Palmer states have in themselves the elements of a perfect circle, and therefore fail more readily. If they have a perfect circuit and battery in themselves, they ought, in reason, not to interfere with the tooth substance, but rather, having the power to saturate any acid or alkaline liquid like any other battery, they ought to be a strong protection to it.

Leaving the domain of pure speculation, I will give the reasons why amalgams do fail, with the proofs. It is well known that gold and tin plugs fail only when they are badly inserted, leaving space for the admission of moisture, decomposing food, &c. When the plug is not tight against moisture, its failure is a question of time only.

I wish now to demonstrate practically, and in a visible form, that amalgam plugs (unless very peculiar treatment is carefully observed) very seldom are moisture-tight from the moment they are inserted, and that whether they are free from shrinkage or not, (the former being a very unusual property as regards the commercial form of amalgams), they cannot with certainty in every case, from their very nature, exclude moisture from any cavity in a tooth which has not received a special previous treatment.

The proof that amalgam is practically free from shrinkage or alteration in form, is that, if packed in a cavity of glass of the diameter of the cavity in a tooth, and covered with a colored solution, the edge remains in absolute contact with the glass after hardening. Taking an amalgam which withstands this test perfectly, prepare another cavity exactly similar, and moisten it inside to about the same extent as a cavity is frequently left in the mouth ; then pack the amalgam in, and immediately cover

it, as before, with a colored solution. In packing, a minute film of water will be seen to distribute itself over the whole surface of the cavity—a mere trace, it is true, but sufficient to prevent perfect contact. After a short time, the force of capillary action will be seen to slowly re-mould the plug, lifting it further away, until a film has penetrated over the whole surface ; but if any part of the cavity is perfectly dry, a very distinct difference in appearance will be observed, and the liquid will be found to have no power to penetrate and re-mould this part of the plug. Any operator who, by any amount of care, can expel this minute trace of moisture, which acts as the thin end of the wedge, possesses an amount of skill I certainly do not, although a very great part of my life has been expended in testing amalgam plugs, and in endeavoring to master their peculiarities thoroughly. If the cavity in which an amalgam plug is inserted is perfectly dry, and the amalgam is free from shrinkage or alteration in hardening, my own experience is that this amalgam plug is an absolute and certain protection, and if the cavity cannot be dried perfectly, it must be made artificially dry or moisture-tight by a varnish which both combines with the dentine and resists the passage of moisture. For this purpose, the best compound I have as yet found is a thick solution of common resin in concentrated carbolic acid, the solution being made with the aid of a gentle heat. That this is perfect I hardly venture to say, but its action is both decided and distinctly visible.

One more point and I have done. Dr. Palmer refers to the washing of an amalgam as an improvement. I should very much like to hear the result of his attempt to make a fit or an approach to a fit to a moist cavity with any amalgam which has been subjected to the peculiarly American process of washing. If, after such treatment, the resulting plug will not pretty nearly swim out of the cavity, I shall be very much surprised, even if he takes for this experiment an amalgam which is really free from shrinkage when not subjected to the absurd and destructive processes of washing and squeezing out excess of mercury.

Absolutely perfect and permanent plugs of amalgam may, with proper care and precautions, be inserted in dry cavities, provided the processes of washing and squeezing be carefully omitted ; but if they can be obtained with any amalgam, even in a dry cavity, after such treatment, I have something to learn, and shall be only too pleased to get hold of a sample. Leaving out the question of the very great risk of a small quantity of moisture remaining in the mass, the power of adaptation and of retaining its form is so seriously injured that it may be taken

as a rule, that the resulting plug is worthless from the moment of its insertion, and that after a few hours or days a space may be distinctly felt with a fine probe between the tooth and the plug. When this space exists, we need not search far for the cause of failure, if our experience of badly fitting gold plugs is of any value.

From the Popular Science Monthly, for August.

PRIESTLEY'S DISCOVERY OF OXYGEN GAS.

By John William Draper, M.D., LL.D.

Continued.

Here, then, we are led to a most remarkable conclusion. If the air for thousands of years has remained unchanged, and if these antagonizing processes are all the time going on, equalizing its constitution, it necessarily follows that the amount of vegetable is accurately adjusted to the amount of animal life ; the one cannot get the better of the other, for, if it did, the excess would be instantly restrained by its antagonist, and, in this point of view, these two grand forms of life constitute together a splendid automatic or self-adjusting machine. Men talk about the dullness of science ; it is only so to those who are unable to follow its developments to their consequences. Where will you find in the whole range of poetry a conception more sublime than this? The two divisions of the world of organization reacting on each other through the medium of the atmosphere—the living against the lifeless, the moving against the motionless ; and not only thus influencing each other through that medium, but maintaining its properties forever unimpaired, and ready for action. It is the glory of astronomy to have proved that the planetary orbs, which circle round the sun, under the influences of a pair of forces thus reacting, can retain their movements undisturbed through a coming eternity. And if astronomy has made the splendid discovery that the inorganic world has attained a condition of eternal equilibrium, chemistry has rivaled it by showing that the same grand truth applies to the world of organization. To watch the eternal coming out of the transitory will always strike a reflecting mind with emotions of the highest admiration. The sunbeam—the finger of God—that reaches across the unknown abysses of the universe in a moment, bringing life out of death, and clothing the objects around us with their many-colored dyes, has extracted this condition of everlasting permanence from a pre-existing transient order of things.

From considering this adjustment of the animal and vegetable kingdoms to each other, we might be led to the idea that each individual in these natural divisions has its counterpart in the other; an idea bringing us into a new relation with inanimate objects. There is implanted deeply in the hearts of all men an instinctive love of natural scenery—forests, flowers, the green grass—and surely such a sentiment cannot suffer from the thoughts now occurring to us. We establish with such objects a relationship, I had almost said a friendship; they become, as it were, a part of ourselves, things essential to our own existence; and that deep attachment we feel to the place of our birth, or our home, finds its apology not alone in natural instinct, or in acquired habits, but also in the highest philosophical considerations. In imagination we might mark off groups in the two kingdoms which are the fanciful representations or counterparts of each other. Perhaps we men, who have to resist the storms of life, may have our representatives in the rugged trees of the forest; the ladies will certainly find their antagonists among roses and other flowers.

From what has been said, you will have gathered how important is the part which oxygen plays in the scheme of Nature. To it is committed the duty of destroying all animal races, and transferring the parts of which their bodies are composed to plants. It begins to discharge this function the moment we begin to breathe, pervading each instant every part of our bodies, bringing on interstitial death, and the continuous removal of particle after particle which it carries away. For there is an incessant change in the substance of all living structures; that which we are to-day differs from that of yesterday and to-morrow, and this untiring agent is all the time at work, assaulting and undermining, nor stopping its action with our dissolution, but going with us into the tomb, until it has restored every particle back to the air. Death is not, as the popular superstition says, a phantom skeleton, nor, as the Asiatics think, a turbaned horseman, who pays his sudden and unwelcome visits. He is this invisible principle in the air which surrounds us, and which is in the very breath we respire.

If thus the duration of individuals and races is determined by the two great systems of forces which have been combined into a self-acting contrivance, it surely is one of the most interesting inquiries in which we can engage, to find in what way so extraordinary a combination has been established. From those remote periods to which we are able to trace the history of the earth, has the same kind of agency prevailed, or have other laws and other self-acting contrivances been resorted to in

other times? You see I here assume the doctrine of the geological antiquity of the earth without any kind of hesitation. During two centuries its spherical form was bitterly denied by many very good and well-meaning men. But the truth at last prevailed. And during the last fifty years its age has in a similar way, and on similar principles, been contested. But this, like the former, is now a settled question; neither the one nor the other is any longer open to debate. He who thinks the earth is only a few thousand years old, simply knows nothing about the matter. He who denies its antiquity will also probably deny its figure.

I proceed, then, rapidly with the inquiry in which we are engaged, and would premise that there is no fact better established in all the range of physical science than that of Prestley's, heretofore mentioned, that plants grow at the expense of the atmosphere. I further call to mind the indubitable fact that all coal, whether bituminous or anthracite, is of vegetable origin; that all the great deposits of these carbonaceous materials, occurring in Europe, Asia, Africa, America, and in the islands of the sea, for hundreds of miles in extent, and of unknown thickness, are vegetable matters once formed under the influence of the sunlight, and existing as luxuriant forest-growths—forests that in succession were entombed in the bowels of the earth. There was then most assuredly a time when all this carbon existed as carbonic-acid gas in the air, giving rise to an atmosphere in which, as we know, animal life could not exist. But the sun had charge of the matter, and as centuries rolled by he was extracting that poisonous gas from the atmosphere, effecting its decomposition, as he did for Priestley, bringing forth from it vital air, oxygen gas, and getting things ready for the appearance and continuance of animal life.

I therefore regard, in a philosophical point of view, the period of the deposit of the coal as the great event in the earth's history. Those who are familiar with the details of these things will recognize it as the epoch which parts off a blank solitude on one side, broken by the rude beginnings of low animal life, from that later period, on the other, which is adorned by all the beautiful contrivances of animated Nature, and crowned by the presence of man. The laws of Nature have ever from the beginning been such as they are now. We are fully able to trace the clear relationship between the condition of living things on the surface of the earth and the constitution of the atmosphere; and what chemistry says ought to have taken place in successive centuries, geology tells us actually occurred. Understanding the changing con-

dition of things as respects the air, we could predict the corresponding changes in animated Nature, and the evidence that we are right is engraved on the rocks and stamped on the ocean.

So, therefore, we see that that relation which now exists between animals and plants, and the atmosphere, is an affair that has sprung out of a prior order of things—that there was a time when the constitution of the air was utterly unfit for the support of animal life; that a purification took place through the action of the rays of the sun; and the deposit of coal marks out the great epoch when life of a high order, among air-breathing animals, became a possibility. And is it not interesting to remark how gradually, from a totally different order of things, have sprung those great laws which determine not only the fixity of the constitution of the air, but also the duration of species and individuals; that automatic, self-acting machine in which animal and vegetable life are the opposing forces.

In thus sketching out the course of events as we now know them to have taken place in those ancient times, and in explaining how one system of laws has spontaneously been developed out of another, we cannot avoid making a comparison between the feeble contrivances of men and the means resorted to for the conservation of the world. We are accustomed to look back with admiration to the wisdom of those great men who laid the foundations of this republic, and established a constitution for it; but what would our admiration be if it had been possible for them to have enacted one single law of such simplicity and comprehensiveness, that every other law, by any possibility required in all the contingencies of a thousand years, should have spontaneously sprung out of it? if it had been possible for them, by one legislative act, to have completed and brought to a conclusion all legislation? The good and evil which we constantly see arising in our political assemblies, what are they but commentaries on the want of wisdom and want of power of man? But what is not possible to man is possible to God; and I think it will always elicit from a reflecting mind a tribute of veneration, to know that this great and intricate machine of the universe, with all the millions of beings, living and inanimate, that compose it, with all their affections, attributes, and relations, are sustained and governed according to the original and unvarying intention of their changeless Author; that from the beginning of things, as respects its physical condition, there never has arisen occasion for retouching a work perfect in itself from the first. I am not among those who regard this system of acting through ancient and self-imposed law as in any

wise derogatory to the Great First Cause. I appeal to the common decision of mankind, whose admiration of any human contrivance or machine is greater in proportion as the machine is self-acting, performing its effects with rigorous precision, according to the conditions under which it was constructed; but less, if the engineer has from time to time to interfere in order to insure its successful action. I recall that well known maxim of the law, "Qui facit per alium facit per se"—whoso acts through another, acts himself It makes no difference in my estimation, in this respect, whether the Architect of the universe himself directly interposed, and compelled such a constitution of the earth's atmosphere as was conducive to the ends he had in view, or whether, under the laws he had imposed on it, the obedient sun proceeded to discharge that task, and put forth his rays with unwonted effulgence, bringing on a great increase in the amount of vegetable life, a great depuration of the atmosphere, the burial of enormous quantities of carbon in the ground, and the gradual assumption by the air of that condition suited to the support of a high organization, and of the life of man. I appeal to the experience of us all—each of the celestial phenomena we witness, the revolutions of the stars, the return of comets, the occurrence of eclipses, each of the changes that happen on earth, the flux of the tides, day and night, summer and winter, the budding of trees and unfolding of flowers, the rise and fall of empires—do they not all take place, not through present and incessant interventions, but in obedience to ancient law? I recall what we all witness as respects the social condition of man, that, according as he advances in intellect, he lives under self-imposed rules, and that his reverence for law is the measure of his civilization; that it is the pride of that civilization to put in the place of an autocrat, dispensing instant rewards and punishments with his own hands, the ideal majesty of the law, which deals out inflexible justice to the good and evil, and makes no distinction of persons; and, reasoning in this manner, from insignificant beings and small things to those which are great, I conclude that a Pure Intelligence will rarely act by intervention, but always through law.

Through that astronomical agency to which I have referred—the action of light exerted during the period of the deposit of the coal—a purification of the atmosphere was effected to such an extent as gradually to enable warm-blooded animals to exist, the temperature to which they attain being directly dependent on the amount of oxygen they take from the air. All animals, from the first period of their coming into existence to the moment of death, are continually, by their respiratory

effort, obtaining this gas, so essential to their very existence, and as continually expelling the effete and dead matters of their systems, under the forms of other airs—carbonic acid, ammonia, and the vapor of water. And thus the atmosphere is the source from which our bodies come, and to which they return, continually during life, and, with the exception of their earthy ingredients, totally after death, and the gases that are found in it are at once the agents and objects of the change. Had Priestley realized these things, could he have induced Chemistry by her witchcraft to compel the gas he had discovered to tell its own story, and how it determined his destiny, his imaginative but theological mind would perhaps have recalled the similarity of its own adventurous inquiry with that of the old Jewish king who visited the sorceress at Endor. Awakened by the power of her spell, there arose, from the enchanted circle over which she waved her wand, the form of an old man whose face was shrouded in his mantle. And he said, "Why hast thou disquieted me, to bring me up? To-morrow shalt thou and thy sons be with me."

Some seek for pleasure in the mere gratification of animal appetites; let us rather find it in the exercise of the intellect; and, when spring approaches, let us rejoice in the change, not so much because there is a promise of food, though we should never forget that all these vegetable products, of which so many are destined to delight our tastes, were mortal poisons while they were yet in the air, but chiefly because they are indications that all that is necessary for us as thinking beings is accomplishing. I have told you that the continuance of the life of man is indissolubly linked with the putting forth of the buds of trees. Let the one fail, and the other will speedily stop. Nay, more; as all our intellectual acts can only go on as a consequence of respiration, and the respiration, too, of such an atmosphere as that of our earth, we perceive that our highest endowments are thus connected with things at first sight apparently having no connection with them. And though it is thus the arch-chemist, the Sun, who transmutes a poisonous gas in the air into fruits, and seeds, and flowers; who prepares the vital medium that we breathe, and enables us, therefore, to think and move, shall we not look with veneration, through his more obvious agency, to a silent influence that is beyond? For these products of his action are so many witnesses to us of a provident foresight for our physical and moral wants. There is an authority who has taught us not to disregard such natural emblems. Who is it that has set his rainbow in the cloud as the pledge of a plighted word? We are surrounded on all sides

with similar indications, and are constantly invited to see in each material event a token of intellectual benefit; and if, as we have seen, from a poisonous atmosphere there has thus gradually been developed, under the agency of that great celestial body, a medium suited to the well-being and conducive to the happiness of man, may we not hope that what has taken place as respects his physical is a type of what will occur as respects his social condition? Who that looks on the events which this year has brought forth*—the overturning of thrones and time-cemented institutions, the bloodshed and atrocities of civil wars—who does not recognize that we are entering on an era? The material atmosphere once had a poisonous constitution, the social atmosphere has it posions, too. There is a cry, almost of despair, from the Baltic to the Mediterranean, from the Black to the Atlantic Seas. It is no imaginary nightmare that is oppressing men, but so greatly has the human mind been developed by the advance of knowledge, that it has outgrown the existing order of things. The pressure of that invisible social atmosphere has become too intolerable to be borne; it must be cleared of its impurities and poisons; there must be freedom for thought and freedom of action. The natural change which we have been considering was only brought about after many a convulsion; the moral change must have its catastrophes. But are we not taught, from this evening's reflections, to trust that there is in this, too, the influence of One far greater than the sun, but of whom the sun is the most noble and appropriate type, who, unaffected by the tempests of the times and the sufferings of men, is steadily shaping the course of events, to bring things at last into a condition suitable for the intellectual as well as the physical well-being of our race?

*This was said in 1848, a year of many political revolutions.

THE TRANSFUSION OF BLOOD.

From The Scientific American.

The idea of returning to an animal blood which has been lost, or, rather, of replacing the vital fluid which has disappeared through the effects of increasing age or the ravages of illness, by transfusion from the veins of another animal in full health, was known to the ancients. It is described in the "Metamorphoses" of Ovid, and repeatedly alluded to in the works of the old alchemists, who believed that by such means perpetual regeneration of the body might be accomplished. Toward

the middle of the seventeenth century, the subject appears to have enlisted the attention of French physicians and philosophers; and in the month of June, 1667, experiments which previously had been frequently practiced successfully upon the lower animals, were for the first time tried upon man. Eight ounces of the arterial blood of a lamb were injected by Denis into the veins of a child. Subsequently calf's blood was transfused into the blood-vessels of a maniac, who shortly thereafter regained his reason. While, starting from these attempts, the operation was again and again repeated, sometimes successful, sometimes the reverse, until it became common in the practice of almost every French physician. Too common, however—whether through the rude means employed for forcing the fluid into the veins of the patients, or whether from the lack of skill on the part of the operators, or, more probably, a lack of caution on the part of the latter, due to supposed familiarity with all the consequences of the operation—for accidents soon became more frequent than successes. In the course of a few months, failures became the rule and cures the exception; the people became alarmed, and finally, in the beginning of 1668, the Parliament of Paris proscribed the practice, and the fulminations of Rome, closely following, effectually arrested any further investigation and experiment. The physicians, however, carefully preserved and printed their records; and from an old treatise, called the *Clysmatica Nova*, printed in Brandenburg, in 1667, we reproduce an engraving, showing how, in those days, the operation was performed. Opening a vein and inserting the end of a common syringe constituted the whole process, in marked contrast to the delicately adjusted instruments and careful measurements now employed.

For a century the subject was abandoned, to be taken up again, however, at the lapse of that period, by Harwood, whose researches showed that blood could not be transfused from one animal to another of different families, without killing the latter within a few days after the operation. From this discovery date the modern investigations, which have culminated in the acquisition of knowledge sufficient to admit of the safe practice of transfusion of blood from man to man.

The early experiments of Denis, and of others subsequently, would seem to negative the above mentioned truth, but the details of the operations, as handed down, are very defective, and in some instances it is known that individuals, at first benefited by the transfusion, subsequently died from its effects. There is certain evidence, however, that death was repeatedly caused by transfusion between widely differing

animals. More modern experiments, especially those of Prevost and Dumas, prove that the blood of calves or sheep, injected into the veins of a cat or rabbit, is fatal, and mammifers inoculated with the blood of

THE TRANSFUSION OF BLOOD, A. D. 1667.

birds rapidly succumb. On the other hand, Lower has shown that the fluid from the veins of one variety of dog acts beneficially upon another dog of different characteristics ; and from the experiments of Milne-Edwards

and Lafond, of still later date, it appears that it suffices for the two animals to be of the same natural group, although belonging to distinct species. An ass, for example, whose blood was nearly exhausted, was reanimated perfectly by the blood of a horse.

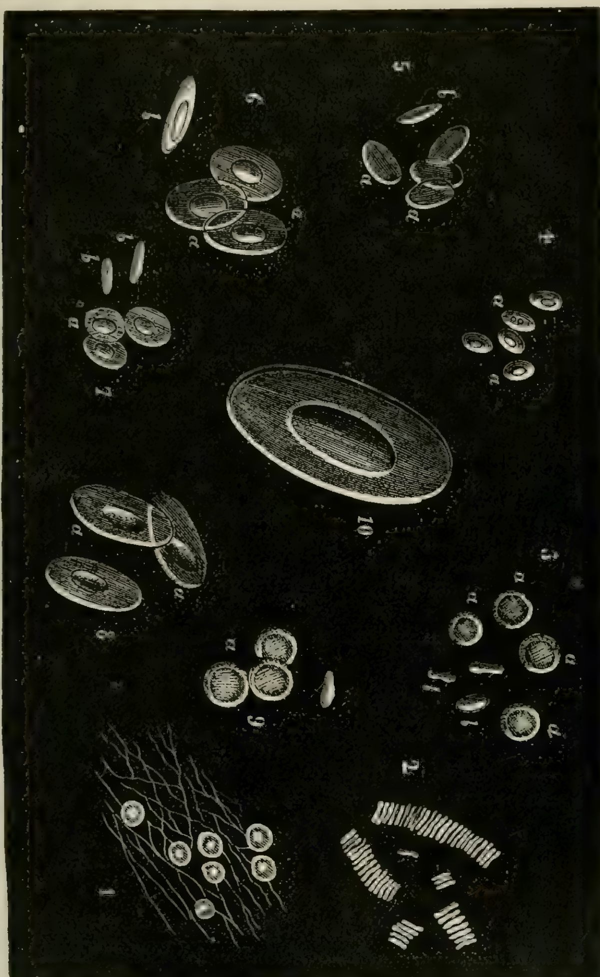
If it is true, then, as facts demonstrate, that in the case of man or other animal whose life is almost extinct through abundant hemorrhage, revivification may be gained by transfusing a quantity of blood much less than that lost, it becomes an interesting matter to determine to what elements the liquid owes its reanimating properties. Prevost and Dumas show that an injection of serum—that is, blood deprived of fibrin and globules—is utterly without effect. On the other hand, blood containing the globules, but in which the fibrin has been destroyed by agitation, gives strong revivifying results, and hence, as extended investigation has abundantly shown, the perfect globule is absolutely indispensable.

In order to comprehend the hurtful effect of the blood of widely differing creatures, as above alluded to, it is necessary to take into consideration the greatly varying shape of the globules in the blood of various vertebrates. The annexed engraving, representing these globules very much magnified, will, in this regard, be of interest. No. 1 represents human globules imprisoned in the fibrin of coagulated blood. No. 2, the same in rolls. No. 3, globules detached, showing them as circular biconcave disks, diameter 0·00026 inch to 0·00017 inch, weight 0·000001 grain, surface 0·000004 inch. No. 4, globules of the camel, elliptical disks, diameter 0·00031 inch. No. 5, globules of pigeon, elliptical, biconvex, diameter 0·0006 inch. No. 6, globules of frog, elliptical, diameter 0·0008 inch. No. 7, globules of cobitis, round, diameter 0·0005 inch. No. 8, globules of water lizard, diameter 0·0015 inch. No. 9, globules of ammocoetis, diameter 0·0004. No. 10, globules of proteus (species of batrachian), diameter 0·0048. *a*, in all the figures, indicates front, and *b*, side views.

The results of later investigations prove that the blood of mammifers may be injected into man without producing hurtful effects, so long as the red globules of the animal do not differ greatly in form and dimensions from those in human blood. If the globules become dissolved and soon disappear in the organism into which they are transmitted, they nevertheless produce advantageous though not permanent results. It would seem, then, that, when human blood is unattainable, that of animals may be used.

The mode of performing the operation at present is greatly improved.

A somewhat recent incident is that of a y oung woman twenty-two years of age, who had become extremely exhausted through hemorrhage and over-work. She was received into the Hospital de la Pitié, in Paris,



BLOOD GLOBULES, MAGNIFIED.

and the transfusion was accomplished by Dr. Béhier from the arm of Dr. Strauss. The aspirator used was so arranged that by no possibility could any air enter with the blood. The latter was sent into a cup

from the veins of the donor and collected in the inferior part of the instrument, whence it was pumped by a small piston worked by a handle. It was then forced through a canula into the veins of the patient. The instrument, in order to prevent coagulation of the fluid, was first immersed in tepid water, and the tubes used were of gold. Before employment, the apparatus was filled with blood, so that considerable of that obtained from the healthy veins was lost. In all, about one ounce out of three was administered, but this was sufficient to secure restoration to the patient, and to enable her, after a lapse of seven weeks, to resume her ordinary occupation.

The New York *Medical Record*, of recent date, contains an interesting paper on this subject by Dr. J. W. Howe, visiting surgeon to a charity hospital in this city. He gives an account of his treatment of an invalid woman, forty years of age, whose pulse was weak and irregular, and at times imperceptible. He says, "I abstracted, by means of the aspirator, four ounces of blood from the median basilic of a healthy man. The blood thus obtained was injected into the cephalic vein of the patient. In a few moments she expressed herself as feeling better. There was an immediate and marked improvement in the volume and force of the pulse. This was so perceptible as to be noticed by all present, and prevented me from transferring any more blood. The next morning I found her pulse still improving and her general condition excellent." The patient subsequently regained her strength and recovered.

OXYGEN GAS AS A REMEDY IN DISEASE.

From New York Medical Journal.

By Andrew H. Smith, M.D.,

Member of the Academy of Natural Sciences, Philadelphia; Corresponding Member of the Gesellschaft fur Heilkunde, Berlin; late Assistant Surgeon and Brevet Major U. S. Army, etc.

APPENDIX.

Letter from Dr. Roof, *of New York.*

New York, *March 2d*, 1869.

Dr. Andrew H. Smith— 213 West 42d Street.

My Dear Doctor : Yours of the 16th of February, requesting particulars in reference to the use of oxygen in my brother's case, was duly received, and I beg pardon for my delay in replying.

My brother first exhibited signs of tubercles about three years ago, the disease then appearing in the upper part of the right lung, and

from the confining nature of his business—that of banker—advanced almost steadily.

On the afternoon of the 9th of February, I was called in haste to see him. I found him propped up in bed with pillows, and suffering intensely from dyspnœa. The fingers and lips were purple; pulse 140, and very feeble; respiration very much hurried; throwing his arms about, and rolling his head from side to side, vainly endeavoring to get sufficient air.

Auscultation revealed, in addition to a large cavity in the left lung, crepitating rales all over both lungs, denoting an accumulation of fluid in the capillary bronchial tubes. The expectoration was scanty, and consisted of frothy mucus.

Dr. James L. Little was then called, and advised the use of stimulants, but, deglutition being almost impossible, only a small quantity was given.

He remained in about the same condition until next morning, when Dr. Little suggested the use of oxygen, and as we had both witnessed your method of administering the gas, we requested your attendance. As you will probably remember, after inhaling the gas for a short time he attempted to change his position in the bed, and this slight muscular exertion brought on a very distressing paroxysm. As this was the most severe one through which he had passed, he attributed its severity to the gas.

For this reason the inhalations were suspended until afternoon, when he again desired the gas. It was now administered as rapidly as I could generate it with your apparatus, for about seven hours, when an accident to the flask deprived me of the further use of it.

I think it would be difficult for me to give an exaggerated statement of the relief afforded by the oxygen at this time. The pulse became stronger and less frequent, being reduced from 140 to 118 per minute; the lips resumed their natural color, and he expressed himself as feeling greatly relieved. During the time he was inhaling the gas he seemed to be very comfortable; but when, from any cause, the inhalations were suspended, he would urge us to hurry and give him the gas again.

The accident to the flask, mentioned above, occurred about 10 or 11 P. M., and as I could not procure another, no more gas could be given. From this time he gradually sunk and died, at about 11 P. M. of the 11th.

Conscious as we all were of my brother's intense suffering for 24 hours, and then witnessing the relief afforded by the gas, we could but

feel deeply grateful for the means of thus soothing his pathway to the grave. I remain, yours respectfully, STEPHEN W. ROOF, M.D.

Letter from DR. HOWARD PINKNEY, *New York.*

DR. ANDREW H. SMITH—

DEAR SIR: In response to your question—"What are your views in regard to the inhalation of oxygen as a remedial agent?"—I willingly give my humble testimony in its favor, and will simply state in what diseases I have used it, and the results.

Asthma.—Among the first cases in which I had an opportunity of using oxygen gas was that of a gentleman from Georgia, suffering from asthma, with emphysema of the lungs. I gave the oxygen during the paroxysm; the patient expressed great relief, and desired that I should leave a bag of the gas with him in case he should be attacked the following night; he returned home in a few days, and I consequently could not carry my investigations further.

Phthisis.—I have had several cases of phthisis pulmonalis under my care, for which I have used the oxygen quite freely. All seemed to have been more or less benefited by its use. I do not believe that the inhalation of oxygen will cure consumption, but I do believe that by its judicious use the different articles of food and those medicines known to be most beneficial in such cases are more readily assimilated, and thereby the life of the patient often prolonged.

Diabetes.—I have treated only two cases of diabetes by inhalation of oxygen, but both were well-marked cases of the disease. The urine in both was excessive in quantity, high in specific gravity; in one over 1040, in the other over 1050. One had double diabetic cataract, and the other puffiness of the retina, with impaired vision. Both improved very rapidly under the use of oxygen gas—the quantity, the specific gravity, and the amount of sugar decreased rapidly. Emaciation, which in one case amounted to about forty pounds in six months, ceased, and both gained flesh. What is rather remarkable in both cases, the disease, since ceasing the use of the gas, has made no perceptible progress, although it is now nearly six months since I ceased to give it in the first case.

Uranic Convulsions.—I have used it in one case of uranic convulsions, following scarlet fever [a case of Dr. Markoe's], where the inhalation of eight (8) gallons of the gas seemed to have checked the convulsions entirely, as they never returned, and the paient made a slow, but perfect recovery. Yours, very respectfully,

24 EAST 41ST STREET, *April 28th*, 1870. HOWARD PINKNEY.

Letter from Lt. Col. J. F. Hammond, *Surgeon U. S. Army.*

Dr. A. H. Smith—

My Dear Doctor : I apply the oxygen in a great many of my cases. Neuralgia, diabetes mellitus, albuminuria, have each been promptly relieved by it, though time sufficient for a cure has not yet elapsed.

A case of soft chancre, indisposed to heal, began to improve after two inhalations of five gallons each, and has healed rapidly since.

Yours truly,

J. F. Hammond,

New York, *February 7th*, 1870. *Surgeon U. S. Army.*

Letter from Dr. J. Messenger.

115 West 32d Street, New York, *April 26th*, 1870.

Dear Doctor : In answer to your letter of inquiry as to what effect the oxygen gas had upon my patient, Mr. H., I have no *special* statement to make. The case was so complicated that I could not refer to any one point, but it acted very materially as a tonic and aider of digestion, and also assisted the action of the alkalies to neutralize the uric acid and give a healthy action to a diseased system that seemed to be failing under all the treatment that had been adopted until the oxygen gas was introduced. Also I think the disease has not been so much inclined to a relapse as before the use of the gas.

Yours truly,

To Dr. A. H. Smith. J. Messenger, M.D.

Letter from Dr. E. S. Bates, *House Physician N. E. Dispensary, New York.*

Andrew H. Smith, M.D.— New York, *April 27th*, 1870.

Dear Sir : Thus far my experience in the use of oxygen, as a remedial agent, has been quite satisfactory. On myself it produced the most agreeable results, and relieved me of an ever-present feeling of malaise and general debility, for which I had resorted to other medication in vain. In the treatment of chronic diseases of the throat and lungs, and in cases of dyspepsia dependent on mal-assimilation, I have had uniform success in the use of oxygen. I used it in one case of long-continued nervousness, for the cure of which a great variety of remedies had been resorted to, and succeeded in making my patient perfectly well. I have other recorded cases in which the use of oxygen gas has had a very favorable action.

Truly yours, E. S. Bates, M.D.

Letter from Dr. C. F. Heywood.

New York, *May 13th*, 1870,
16 West 32d Street.

My Dear Doctor: The record of my experience in the use of oxygen gas is necessarily brief. The cases are not numerous, and have not been recorded in writing. The great facts are, however, very clearly remembered. As a summary, I have to say:

1st—I have seen the inhalation of oxygen gas instantly relieve asphyxia in a puerpural case, which was so nearly fatal that all the bystanders supposed the woman to be dead. It was not a case of hysteria, but pulmonary congestion.

2d.—I have seen the muco-purulent expectoration of chronic bronchitis and phthisis very much reduced in amount, when oxygen has been inhaled daily for two or three weeks. I have generally given it for ten minutes at each session.

3d.—I have never seen numular sputa lessened in amount.

4th.—I have never found the general fever of advanced phthisis to lessen.

5th.—I have seen the degenerative process of an old pneumonia retarded.

6th. I have seen the pulmonary disintegration which sometimes follows saccharine diabetes arrested for some time, (this was after the sugar had disappeared from the urine, and the thirst had ceased,) but in this case sudden death occurred from the rupture of an artery from which the natural support had been removed by ulceration.

7th.—I have never seen the general wasting of phthisis lessen under the use of oxygen gas. This observation is not in accordance with the results published by Dr. Hackley.

8th.—I have not had opportunity to test sufficiently the use of the gas in Bright's disease, or in suspected fatty placenta. Several years ago I sent a circular letter to many public institutions and to our Board of Health, urging the use of oxygen gas in cholera, but I believe there are no records of its use, excepting those referred to by you in the article in the *N. Y. Journal of Medicine.*

On the whole I should say that oxygen is capable of giving temporary relief to some of the symptoms of phthisis, asthma, chronic bronchitis, *bronchite capillaire*, especially to the pneumonic degenerative processes.

I might add that pulmonary hemorrhage has occurred in about fifty per cent. of my cases, and in two out of these it has occurred for the

first time after the patients had been placed under the use of oxygen gas. This statement is only of negative importance, to show that the gas will not prevent or lessen the chances of bleeding.

Sincerely yours,

C. F. HEYWOOD.

Letter from DR. CARDNER.

221 East 58th Street,

Dr. A. H. SMITH— NEW YORK, *June* 15*th*, 1870.

DEAR DOCTOR: I found that oxygen benefited both my patients. It increased the appetite and lessened expectoration, and resulted of course in a general improvement of strength and condition.

My cases do not come under the head of those so far gone as to suffer much from dyspnœa, but are yet both hopeless, so far as any permanent amendment is concerned, and therefore probably fairly represent that class of cases. One is a case of tubercular, the other of so-called bronchial consumption.

I was a little cautious at first, noting the pulse, temperature, and character of cough and sputa, but observing nothing alarming, but on the contrary, in the tuberculous case finding the temperature reduced from 101° F. to 99° F., I felt encouraged to go on until I began to realize the improved condition mentioned above. In the tuberculous case, making a deduction for improvement in the weather and also for improvement following the controlling of an exhausting diarrhœa, yet I must credit oxygen with the improvement of her appetite and with lessening her great nervousness, almost paroxysmal, so that from being housed she now goes out, and contemplates going to Clinton Co. next week.

Respectfully,

J. G. CARDNER.

Dr. G. Frauenstein has kindly furnished me with notes of a number of cases treated by him in addition to those mentioned in the foregoing pages. The principal points in these cases are as follows:

Case of diptheritic scarlatina, angina alarming, delirium. Each inhalation of the gas caused the delirium to give way at once to sleep. Thirty gallons of oxygen were given per day, for the first four or five days; the quantity was then reduced to nine gallons, and continued for four or five weeks as a tonic. No other treatment except concentrated nourishment and the local use of chlorate of potash and carbolic acid.

A girl, three years of age, had diptheria with a scarlatinoid eruption; pulse too rapid to be counted, but seemed about 200. Oxygen was administered, and in twenty-four hours the eruption had entirely disappeared, and the pulse had fallen to 120. The fourth day the child sat up and ate. No other treatment except local. "The recovery was so unexpectedly rapid that I am inclined to believe that after all the child was not so dangerously sick; and it was, perhaps, only her peculiarity to be overwhelmed by fever at any commencing sickness. It was the first time I had seen the child."

A case of septicæmia after parturition, caused by retention and putrefaction of clots. Ergot was given, and whether from that cause or from absorption of putrescent matter, gangrene of the feet was threatened. The pain in the feet was agonizing; the toes became blue and almost insensible, "and the line of demarcation began to be foreshadowed." The pulse, which had almost ceased in the extremities, was found to be 180 in the carotids. The body was covered with a cold, clammy sweat. The ergot was stopped, and quinine (gr. x bis die,) beef-tea and wine given, together with injections of carbolic acid and hot applications to the feet. The next day inhalations of oxygen were begun, and the following day reaction set in, and convalescence was gradually established. How much was due in this case to the oxygen, how much to the other treatment, and how much to the powers of nature, it is impossible to determine.

Acute Metritis.—"Oxygen had, of course, no demonstrable effect in the course of the disease, but *sleep and appetite were kept up, and the debilitating effects of sickness and confinement in bed to a considerable extent counteracted, and the convalescence quickened. It was as if the food were more readily assimilated. This latter circumstance I am not afraid to pronounce an axiom.*"

The Doctor sums up by saying that while he can not demonstrate that the success of his cases was the direct result of the use of oxygen, yet in all cases in which he has used the gas he has observed an uncommonly rapid recuperation of the strength after recovery commenced; and in cases beyond hope, as of phthisis, etc., it diminishes the suffering from exhaustion.

In a previous letter he cites a number of instances in which it was given in the last stages of phthisis, with the effect of relieving pain and dyspnœa, and unquestionably prolonging life.

FOURTEENTH ANNUAL MEETING OF THE AMERICAN DENTAL ASSOCIATION AT DETROIT, MICH.

The American Dental Association met in St. Andrew's Hall, Detroit, at 10 o'clock, Aug. 4th, and was called to order by the President, Dr. T. L. Buckingham, of Philadelphia.

After prayer by the Rev. L. P. Mercer, of the Swedenborgian Church, the records of the last meeting were approved without reading.

The following was substituted in place of old section 3 of the constitution.

Sec. 3. Members to be of three classes. The members of this Association shall be of three classes, viz.: Delegates, permanent and honorary members. The two former classes having equal rights and privileges, except eligibility to office—none being eligible to hold office except permanent members; the latter class to consist of prominent worthy members of the dental profession residing in foreign countries, who shall be elected by ballot.

The following amendment to section 5 of the code of ethics was then submitted by the Secretary, and adopted by the Association:

It is unprofessional to resort to public advertisements, such as cards, handbills, posters, or signs, calling attention to peculiar styles of work, prices for services, special modes of operating, or to claim superiority over neighboring practitioners: to publish reports of cases, or certificates in the public prints; to go from house to house soliciting or performing operations; to circulate or recommend nostrums, or to perform any other similar acts. But nothing in this section shall be so construed as to imply that it is unprofessional for dentists to announce in the public prints, or by card, simply their names, occupation and place of business; or, in the same manner, to announce their removal, absence from or return to business; or to issue to their patients, appointment cards having a fee bill for professional services thereon.

Dr. G. L. Field, from the Executive Committee, reported in favor of making the sessions of the Association from 9 A. M. to 12.30 P. M., from 2.30 to 5.30 P. M., and from 7.30 in the evening until adjournment. Also, that Wednesday afternoon be set aside for a boat ride on the river, at 2 o'clock sharp. Adopted.

Dr. Sheppard, of Boston, that all dentists and physicians in Detroit be invited to seats in the convention. Adopted.

The Association then adjourned until 2.30 o'clock P. M.

Upon assembling at 2 o'clock, the minutes of the morning session

were read and approved, after which the Secretary offered a resolution to the effect that the names of all members in arrears for dues at any time be dropped from the roll, and that they be not reinstated or received as members, or received as delegates, until all arrearages are paid in full.

Dr. Whittaker moved to amend by voting that hereafter no person shall be received as a delegate until his dues are paid. Carried, and the resolution, as thus amended, was adopted.

The President announced as a Committee on Appliances, Drs. Field, Thomas, and Brockway.

The Committee on Credentials reported the following members of the Association present : Homer Judd, St. Louis ; W. H. Goddard, Louisville ; I. J. Wetherbee, Boston ; C. S. Stockton, Newark, N. J. ; C. C. Knowles, S. E. Knowles, San Francisco ; C. E. Dunn, Louisville ; M. H. Webb, Lancaster, Pa. ; T. L. Buckingham, Philadelphia; J. Taft, Cincinnati ; J. W. Baxter, Vevay, Ind. ; C. R. Taft, Mansfield, O. ; M. L. Chaim, J. L. Swartley, E. D. Swain, W. C. Dyer, M. S. Dean, Chicago ; C. N. Pierce, J. H. McQuillan, Philadelphia ; John Stephan, Cleveland ; A. H. Brockway, Brooklyn ; E. S. Gaylord, New Haven ; Edmund Osmond, Cincinnati ; W. W. Allport, Chicago ; H. L. Ambler, Cleveland ; George Elliott, Buffalo ; John Allen, E. A. Bogue, A. L. Northrop, W. A. Bronson, New York ; C. D. Elliott, Meadville ; W. H. Atkinson, New York ; C. C. Carroll, Meadville; J. N. Crouse, Chicago ; G. W. Keeley, Oxford, O. ; B. T. Spellman, George L. Field, Detroit ; C. D. Cook, C. H. Biddle, Brooklyn ; W. H. Morgan, Nashville ; C. R. Butler, Cleveland ; L. D. Sheppard, Boston ; S. B. Palmer, Syracuse ; H. A. Smith, Cincinnati ; S. H. McCall, Binghamton ; J. R. Walker, J. S. Knapp, New Orleans ; E. J. Waye, Sandusky ; J. M. Austin, St. Joseph, Mo. ; G. H. Cushing, J. A. Swayze, Chicago ; Seneca Brown, Isaac Knapp, Fort Wayne ; G. R. Thomas, Detroit ; Corydon Palmer, New York ; S. Welchens, Lancaster, Pa. ; E. M. Wolfe, Oil City, Pa.

Dr. Dean, of Chicago, read a paper upon the subject of "Dental Physiology" in general, but particularly the absorption of deciduous teeth.

He was followed by Dr. McQuillan, of Philadelphia, who, at the request of the Association, read a paper prepared by him on the same subject in 1860. He gave a concise description of the formation and development of the teeth in the human fœtus, illustrating his remarks with anatomical specimens.

Remarks upon the same subject were made by Drs. Atkinson, of

New York, Knapp, of New Orleans, and Judd, of St. Louis, after which the paper was passed.

Dr. Crouse, of Chicago, reported that the committee appointed to collect a cash testimonial for Dr. Barnum, of New York, the inventor of the rubber dam, were progressing favorably, and asked that all Associations that have not donated, do so without delay.

Dr. Keely spoke in favor of devoting all surplus funds in the possession of the Association at the close of the present meeting to this purpose. He added that the matter was being agitated in Canada and in Europe, and a handsome response was expected from those countries.

The convention then adjourned until 7.30 o'clock.

At the session in the evening, the consideration of dental physiology was resumed, Drs. Hunter, Atkinson, Judd, Taft, Osmond, Knapp, Bogue, and McQuillan speaking thereon. The report was then passed.

Dr. Cushing read a paper on the subject of Dental Pathology, showing the formation of enamel, dentine, etc.

This paper was discussed by Drs. Atkinson, Judd, Watt and Bogue, Butler, Morgan, Walker, Crouse and others, Dr. Bogue in the course of his remarks giving the pathology of toothache, and the cures therefor.

Dr. Thomas stated that he was pleased to announce that a better place for meeting had been secured for the remainder of the sessions, and invited the members to assemble in the Council Chamber on Wednesday morning at 9 o'clock.

The Association then adjourned.

The Association met in the Council Chamber Wednesday at 9 o'clock and was called to order by the President.

After the minutes of Tuesday evening's session had been read and approved, consideration of the subject of Dental Pathology was resumed, and Drs. Taft, of Cincinnati; Spelman, of Detroit; Watt, of Cincinnati; Morgan, of Nashville; Judd, of St. Louis; McQuillan, of Philadelphia; Atkinson, of New York; Dean, of Chicago, and Bogue, of New York, spoke on the topic. The subject was then passed.

The Committee on Credentials reported that the following delegates had paid their dues and subscribed to the Code of Ethics; C. Stoddard Smith, Springfield, Ill; H. B. Noble, Washington; Jas. S. Knapp, New Orleans; C. M. Bailey, Machias, Me.; A. W. Freeman, Chicago; Isaiah Forbes, St. Louis; J. S. Smith, Columbia, Pa.; D. C. Hawxhurst, Battle Creek; L. Buffet, Cleveland; G. W. Klump, F. J. Richards, Williamsport, Pa.; Geo. Watt, Xenia; B. R. McGregor,

Rochester; W. G. Cummings, Sturgis; W. E. Magill, Erie, Pa.; J. F. Marriner, Ottawa, Ill.; George Elliott, Meadville, Pa.; C. D. Elliott, Franklin, Pa.; W. O. Kulp, Davenport, Ia.; E. S. Holmes, Grand Rapids; W. H. Jackson, Ann Arbor; E. S. Southworth, Niagara Falls; C. F. Allen, New York; R. B. Donaldson, Washington; E. N. Clark, Beloit; A. Holbrook, Milwaukee.

Dr. Taft moved that the order of clinics at this session of the Association be dispensed with, and the same prevailed.

The report of the Committee on Histology was called for, when Dr. Taft, the only member of the committee present, stated that no report had been prepared. Death had taken away their chairman, the late Dr. T. B. Hitchcock, of Boston, and illness had prevented another member from being present. He asked further time, and it was granted.

Dr. Bogue moved the appointment of a committee to draft resolutions of respect to the memory of the late Dr. Hitchcock, Dean of the Harvard Dental College. Carried, and the chairman appointed Drs. Bogue, of New York, Taft, of Cincinnati, and Sheppard, of Boston.

Dr. H. A. Smith, of Cincinnati, read a lengthy paper upon the subject of Dental Chemistry.

Dr. Sheppard, of Boston, offered a resolution to empower the Executive Committee to fix the place of future meetings of the Association. He explained that this may be necessary in case of calamity by fire or pestilence to the city where the meeting had been appointed. Objected to and laid over.

Dr. Sheppard moved a resolution of thanks to S. S. White for his efforts in defending the rights of dentists to vulcanite, with the hope that he will carry the question to the Supreme Court. Tabled.

The Association then adjourned.

At 1.30 o'clock the Association reassembled in the Council Chamber, and shortly before 2 o'clock formed in procession in the corridors of the City Hall, and, escorted by the Twenty-second Infantry Band, marched to the foot of Woodward Avenue, 200 strong, embarking on the steamer *Grant* for an excursion to Grosse Isle. Upon leaving the dock the *Grant* steamed up past the Detroit and Milwaukee depot, then turned and proceeded down the river, reaching Grosse Isle before 4 o'clock. The excursionists were hospitably received by mine host Alexander, who threw all his parlors, pleasure and recreation rooms and grounds open for their entertainment. The banqueting hall was also in readiness for the guests, and for over an hour the tables were surrounded by a crowd that had come here to enjoy themselves and

knew how to do it. At 5.30 o'clock the return trip was commenced and dancing was in order nearly all the way to the city, the band furnishing excellent music. The excursion throughout was a most enjoyable and successful one.

Upon reaching the dock, the dentists marched directly to the Council Chamber, and at 8 o'clock were called to order for the evening session.

On motion of Dr. Weatherbee, of Boston, the subject of Dental Pathology, considered at the morning session, was passed.

Dr. Taft asked an extension of time until Thursday in which to prepare his paper on Histology.

The subject of Therapeutics then came up, but no member of the committee was present to report, and Dr. Taft moved the appointment of a new committee. Adopted ; and the chairman appointed as such committee, Dr. Taft.

Dr. Webb, of Lancaster, Pa., read a paper on the subject of Etiology, or the science of causes, treating of the causes destructive to tissues in general, and dental tissues in particular. The paper was received and passed.

Dr. Sheppard, of Boston, read a paper on the subject of Operative Dentistry. It dwelt at considerable length upon the mechanical appliances used by dentists, and indicated those, in the opinion of the reader, most desirable. For the filling of teeth, he favored platinum, or an amalgam of 120 parts of tin, 30 of silver, and 25 of mercury. It was as solid as gold, and more pleasing to the eye. The great discoveries of the present age, in dentistry, have been cohesive gold and the rubber dam. By these discoveries the possibilities of saving decayed teeth have been largely increased. The filling of teeth to-day with gold is a much longer and more painful operation than in the past. He was not in favor of cheap dentistry, but was in favor of the substitution of dentistry for the poor, in the place of cheap dentistry. Dentists were divided into three classes : those who adopt every invention of the day, without first investigating its claims of superiority ; those who use the same old appliances year after year, adopting nothing new, and giving generally good satisfaction to patrons, and those who give new inventions a thorough investigation and trial before adopting or rejecting them. To this latter class belonged, the reader hoped, a large majority of the popular and successful dentists of the age.

Dr. Southworth advocated the use of an amalgam filling containing a less amount of mercury than the kind mentioned by Dr. Sheppard.

Dr. Crouse was in favor of using heavy gold for filling, instead of cohesive gold or amalgam. In his opinion teeth could be filled quicker and with less pain with oxy-chloride of zinc than with tin foil.

Dr. Morgan protested against the use of the expressions "hard" and "soft" foil, as they were being used in the discussion. The proper soft foil was the most cohesive of all foils.

Dr. Weatherbee thought the rubber dam of the utmost importance in filling labial cavities that extend up beneath the gum. Its use was less painful and disagreeable to the patient than the use of a napkin. He explained in a minute manner each step of the operation as performed in his practice. He had thrown aside the light, wooden mallet, long since, and adopted in its stead a lead mallet weighing 5½ ounces.

Dr. Thomas, of this city, spoke strongly in favor of the report of the committee, and hoped that it would be adopted.

Dr. Taft moved that the Association meet at St. Andrew's Hall Thursday morning at 8 o'clock for clinics, but the chairman refused to entertain the motion, on the ground that the Association had decided to have no clinics, and, therefore, could not act upon the motion.

A member moved that the vote on the question of clinics be reconsidered, but while this motion was pending the Association adjourned.

The Association assembled at 10 o'clock, the President, Dr. T. L. Buckingham, of Philadelphia, in the chair.

DENTAL SURGERY IN THE ARMY.

Dr. F. H. Rehwinkle, of Chillicothe, Ohio, from the committee appointed to confer with the Surgeon General of the army of the United States for the appointment of dental surgeons for the army, reported that with the tendency of Congress toward cutting down instead of increasing the army, the committee deemed it inexpedient at the present time to make any such request. The report was adopted and the committee discharged.

OPERATIVE SURGERY.

The subject of Operative Surgery was resumed, and Dr. George H. Cushing, of Chicago, read a paper upon heavy *vs.* light gold for the filling of teeth, expressing a preference for heavy gold, and giving it as his opinion that heavy gold, in the hands of a skillful operator, will produce the best results.

Dr. Butler, of Cleveland, doubted whether, as was asserted in the paper read last evening by Dr. Sheppard, there was more time spent in gold fillings than there was fifteen or twenty years ago. If there is more

time spent it is because dentists now undertake more difficult operations, and a finer finish is demanded than formerly by patients; a fine piece of workmanship takes time in its accomplishment. He advocated the use of the rubber dam in almost every case where a tooth is filled. With reference to the kind of gold to be used, he thought it depended very much upon the work to be done, and the operator must judge where each kind should be used.

Dr. Knapp, of New Orleans, commended very highly the report of Dr. Sheppard on Operative Dentistry. He differed with him, however, in giving credit to Dr. Arthur for the preparation of adhesive gold, and said that the older members of the profession will remember that Dr. Leach, of Baltimore, prepared gold, fully as adhesive as any ever prepared by Dr. Arthur, fully thirty years ago. The assertion made by Dr. Sheppard, that only the best work can be accomplished by the rubber dam and adhesive gold, he considered a fallacy, and stated that the best of work has been done without the use of either. There are cases where the rubber should be used, but its use is generally carried to an extreme. He also believed that the use of machinery is carried to a too great extent, and that in certain cases, where the decay extends close to the pulp, a devitalized pulp results from the use of machinery.

Dr. John Allen, of New York, thought it mattered but little what kind of gold was used, or what method was employed, so long as good work was done. He can call to mind many fillings put into teeth forty years ago that are doing service now. He believed that taking the mass of dentistry of to-day, it is not so good as it was thirty years ago.

Dr. Keely, of Oxford, Ohio, believed that with heavy gold, the burring engine, the mallet and rubber dam, the best results can be secured.

Dr. Kulp, of Davenport, Ia., said that during the past year he has examined the fillings placed in different people's mouths by twenty-two different operators present at this Association, the patients coming from the East. The result of his examination led him to believe that those who have followed the modern improvements have put in the best fillings. He did not believe in vacillating in the use of different kinds of gold, and thinks that one kind steadily used is the best. He uses No. 4 gold, and considers it the best for general use.

Dr. Rehwinkle, of Chillicothe, Ohio, said we have to battle with the abuse of good things. The judicious use of the rubber dam he regarded as of great importance, but there are some young dentists who cannot do any work except by the use of the rubber dam and adhesive

gold. No preceptor should allow a student to go out of his office unless he was able to fill a tooth without the use of the rubber dam, and with non-cohesive gold. The conditon of the tooth and the health of the patient he thought had much to do with the result in most cases.

Dr. Stockton, of New Jersey, thought there were some kinds of teeth that could only be treated with soft gold, while others could only be treated with adhesive gold. He thought that the appliances of to-day were so good that every filling should be put in so thoroughly tight as to last for a life-time.

Dr. Osmond was of opinion that other material could be used with as much success as gold, and that in certain conditions of the teeth it was not practicable to use the mallet upon them, as it will break them.

Dr. Bogue, of New York, also presented some views on the subject of Operative Dentistry in general.

Dr. Judd, of St. Louis, said there was a demand for all kinds of dentistry, especially in large cities ; that some dentists have a class of patients who demand the best kind of work, finished in the highest style of art ; there are others who are not so particular, and so the demand runs down to the cheapest kind of work. Dr. Judd thought Dr. Sheppard was too conservative in his remarks on the rubber dam, and spoke of it as one of the most important appliances of the profession. He was not ready to endorse tin as a filling in place of gold, and said that a filling of soft gold could be made as easy as tin. He thought that in many cases the teeth were not cut out enough. He believed in filling the canals of teeth with gold, and was quite sure fangs should be filled with nothing but gold. He was satisfied that the canals of teeth could not always be entirely filled up with gold. With reference to operating, he said there were very many fine operators in the United States who were not good dentists, and there was more injury from injudicious filling of teeth than was necessary.

Dr. Sheppard, of Boston, maintained that in certain cases tin foil was best to be used. The majority of people, he said, are poor, and they must be treated as skillfully as the best. If their teeth can be saved, the dentist who operates upon them and preserves them for one dollar a cavity is as much a benefactor as the dentist who works for rich people and charges ten dollars per hour. The amount of gold required to fill a tooth costs too much to be afforded by poor people.

Prof. McQuillan, of Philadelphia, advocated the very best of work under all circumstances, whether the patient be able to pay for the services or not.

Dr. Allport, of Chicago, thought the gold used should be that kind which the average dentists of the country can use to the best advantage, and he considered that soft gold in the hands of the average dentist saved more teeth than the adhesive gold, because it can be more easily packed to the side of the tooth. He considered the rubber dam as a most important adjunct to the filling of teeth, and he used it invariably.

OBITUARY RESOLUTION.

Dr. Bogue, from the committee appointed to draft resolutions relative to the death of Prof. Hitchcock, reported the following :

Whereas, This Association has with sorrow learned of the death of Prof. Thos. B. Hitchcock, of the Harvard Dental School, one of our most valued members, and the chairman for this year of the Committee on Histology and Microscopy, therefore

Resolved, That we signify in this public manner our sense of the great loss which the profession and the cause of dental education has sustained, and that this resolution be inserted in the records, at the place where the report of the committee would have appeared.

The Association then adjourned to half past two o'clock P. M.

The forenoon subject—Operative Dentistry—was resumed at the afternoon session, and was further discussed by Dr. Palmer, of Syracuse, who spoke of the use of galvanism in operative dentistry. Dr. Knapp, of New Orleans, also spoke on hemorrhage after a tooth is extracted, and its remedy.

Dr. Atkinson, of New York, thought that in the discussion too much had been said about the mere mechanism of the work of filling the teeth, and not enough of the principles of the science. The best of results, he thought, could be secured from the use of the rubber dam. The kind of gold used, he did not consider a matter of any special importance so long as the work was done well, and the best thing a dentist can do is to do the best kind of work.

The general subject was also further discussed by Drs. Taft, Walker, Webb, Forbes, Thomas, Rehwinkle, Allport, and Hunter, principally upon the treatment of diseased pulp, after which the subject was passed.

DENTAL APPLIANCES.

Dr. George L. Field, chairman of the Committee on Dental Appliances, read a report upon the various new appliances for the use and benefit of the dental profession in the filling and extracting of teeth, the committee making favorable report on such as, in their opinion, deserved it. The subject was passed.

ETIOLOGY.

The subject of Etiology was again resumed, and Dr. J. H. McQuillan, of Philadelphia, made a report, illustrating the subject with diagrams on the blackboard, and showing the presence of parasites in the teeth, and their action in producing decay. He was followed by Dr. Noel, of Nashville, Tenn., after which the meeting adjourned until half past seven o'clock.

On motion of Dr. Crouse, the Association proceeded to select a place for the next annual meeting of the Association on the first Tuesday of August, 1875, and chose Niagara Falls.

The Association then proceeded to the election of officers for the ensuing year, with the following result :

President—M. S. Dean, Chicago.

Vice Presidents—George W. Keely, Oxford, O., and James S. Knapp, of New Orleans.

Corresponding Secretary—Dr. George L. Field, of Detroit.

Recording Secretary—Dr. C. S. Smith, of Springfield, Ill.

Treasurer—Dr. W. H. Goddard, of Louisville, Ky.

Executive Committee for one year.—C. H. Cushing, of Chicago ; L. D. Sheppard, Boston ; H. A. Smith, Cincinnati ; George L. Field, George R. Thomas, Detroit.

For two years.—Dr. A. L. Brockway, of Brooklyn ; Dr. G. C. Daboll, Buffalo ; S. B. Palmer, Syracuse, N. Y.

SPIRITUAL PHENOMENA.

At a private party, given at his London house recently, Sir Charles Wheatstone exhibited some curious electrical experiments for the amusement of his friends, which would seem to throw some light on certain so-called "spiritualistic manifestations." In a dark room, by a stamp of his foot, Sir Charles produced a brilliant crown of electric light in mid-air, while musical instruments seemed to be played by invisible hands, whereas the sounds really came from an adjoining room, in which the player sat, and were made to appear to be produced by the instruments before the spectators by an ingenious contrivance. A contest between Science and the "spirits" in their own chosen feats would be almost as memorable as the celebrated competition between Moses and the magicians.—*Liverpool Post.*

NOTES.

THE NEW CHEMISTRY. By JOSIAH P. COOKE, JR., Professor of Chemistry and Mineralogy in Harvard College. Price, $2.00. New York: D. Appleton & Co., 1874.

Those who pursued their chemical studies fifteen or more years ago, and who were delighted with the simple yet comprehensive nomenclature, and the equally transparent chemical notation of the science as then taught, can hardly have viewed the substitution of another nomenclature and a more complicated system of symbols without dismay.

If the beautiful theory which so satisfactorily explained the union of an "acid" and a "base" to form a "salt" is swept away by the results of the investigations of these few intervening years—if indeed, as the younger chemists tells us, there is no such thing as a "salt" in the sense of the old text books, if our old familiar friend, carbonate of soda, $NaO\,C\,O_2$, is a nonentity, and the unfamiliar and anti-euphonious sodic carbonate, $Na_2C\,O_3$, is forced into its place, we exclaim—what is left of *our* chemistry! To unlearn all we spent so many years in acquiring, seems hopeless, and in the midst of active labor, we doubt our ability to form intimate acquaintance with the multifarious, unfamiliar forms that stare us in the face, through the symbols employed by the more recent chemical writers. Those of us who keep sober, may view with indifference the displacement of $C_4\ H_6\ O_2$, of the old system, by $C_2\ H_6\ O$ of the new, and yet be very little pleased to lose our $H\,O$, pure and sparkling, receiving in its stead H_2O, which at first sight we may reasonably fear is but a misprint for the acrid $H\,O_2$.

To those of our dental friends who have endured like despondency, Dr. Cooke's New Chemistry, (thirteen lectures before the Lowell Institute), will bring unexpected relief. It has a charm that is irresistible, and when a lover of chemistry commences to read one of his lectures, the business which calls him from it may be safely called important. One soon finds that his case is not so hopeless as he at first supposed. The *things* of which he learned the properties are not changed, and he knows them, as he does some faces, "by sight." He has only to associate with some of them modified names, and this in accordance with a theory more satisfactory and enchanting than that of the older writers. The unfamiliar symbols carry a store of information even more comprehensive than was conveyed by the notation that used so to delight him. The lectures were designed for "an intelligent, but not a professional audience," and cannot fail to interest and instruct any who have love for chemistry or chemical philosophy.—ED.

A Meeting of Dentists.

A meeting of dentists called at a few hours notice on Tuesday afternoon, Aug. 18th, on receipt of the news of the death of Dr. George E. Hawes, of this City, at Wrentham, Mass, was held at the residence of Dr. J. G. Ambler, No. 25 West Twenty-third street, who presented the following preamble and resolutions, which were unanimously adopted.

Whereas, An all-wise Providence has seen fit to remove by death, our much esteemed friend and professional brother, Dr. George E. Hawes, of this City; therefore,

Resolved, That while we bow in humble submission to the decrees of Him who doeth all things well, we cannot refrain from expressing our feelings of sadness

and sorrow at the loss our profession has sustained in the demise of our much esteemed friend and brother.

Resolved, That we show our affection and appreciation for his many virtues and bright example, by placing on record these expressions of our bereavement and sorrow.

Resolved, That our sympathies, true and heartfelt, are hereby tendered to the family and friends of deceased, as well as the profession at large, in this dispensation of Providence. Though we lament his death, we cannot be unconscious that our loss is his gain.

Resolved, That a committee be appointed by the chair to prepare a suitable memorial for publication in the dental and medical journals.

Resolved, That these proceedings be published in the *New York Times* and the *Observer;* also a copy sent to the family of deceased.

(Signed,)

JOHN ALLEN, *Chairman.*

J. G. AMBLER, *Secretary.*

Committee on Memorial—J. G. Ambler, John Allen, W. H. Atkinson, J. Parmley, S. Conk.

Dr. Hawes had been in practice in this city for over thirty-five years, occupying a position second to none. He was universally esteemed and respected. At his death he was sixty-four years of age. He died while on a visit to his native place, Wrentham, Mass., and leaves a wife, two sons, (both of whom follow his profession) and two daughters.—*N. Y. Times*.

Expensive Dental Dentistry.

The well known actress, Miss Agnes Ethel, had occasion some time since, it appears, to employ the professional services of the dentist, Dr. William H. Atkinson. The dental artist employed his best professional skill to put in order the biceps and molars of Miss Ethel, and, his work of reconstruction completed, sent in a bill of $1,025. Objection was made to the bill on the ground that the charges were exorbitant, and the result was a suit by Dr. Atkinson to compel its payment. On behalf of the defendant, motion was made yesterday in Supreme Court, Chambers, before Judge Donohue, by General Anthon, for a further bill of particulars. The bill, as submitted, contains six items, from June 8 to June 14, 1873. Each item is in this form : "To services of —— operators in dressing your teeth, together with the gold filling necessary therefor, $——," some of the blanks being filled up with two or three operators, and the amounts charged ranging from $50 to $300, the bill aggregating, as already stated, $1,025. It was thought that these items were hardly specific enough, and hence a motion for a more particular bill of particulars. In commenting on the bill General Anthon confessed that he was at a loss to know the meaning of "dressing teeth," and he desired instruction on that point.

"I am no dentist," said, in reply, the plaintiff's counsel; "but there were six teeth operated upon. Drilling teeth is a scientific operation, and their filling with gold. The dentist's aid is important to the fair sex, especially to a professional lady, designed to make a presentable appearance in public."

"I want to know," answered General Anthon, "how many cavities you filled. We only know of your filling four teeth."

"I am unable to enumerate the cavities filled," said the opposing counsel.

Judge Donohue looked over the bill, and said that the plaintiff must give in his bill such a description of the services rendered that any artist looking over it can form an estimate whether the amounts were properly charged or not. He accordingly granted the motion.

[*N. Y. Herald.*

THE
Morrison Dental Chair.

Price $150.00, or, with Castors, $160.00. Boxing, $5.00.
Spittoon Attachment, $8.00.

It possesses great superiority over any chair before offered to the profession, and is at the same time less expensive than any other first-class chair. Some of its points of superiority we here enumerate :

1st. All the advantages of any low-based chair, and also of any high-based chair, are here secured in a single chair. In it the patient can be placed lower than in the lowest-based chair made, or higher than in any other of which we have knowledge. At its lowest position the seat is fifteen inches, and at its highest position forty-two inches above the floor.

2d. The operator using the Morrison Chair can either stand or sit at his work, as he may choose, working with equal convenience in either position.

3d. It has been a very general complaint that dental chairs are too wide at the back, so holding the operator away from his work. Here this difficulty is overcome. The chair is narrow at the back, so that the operator need not stretch to reach the patient, but *can lower either arm of the chair out of the way* and so be as near the patient as he may choose.

4th. It can be changed from its lowest to its highest position in seven seconds—a celerity impossible in any chair raised by a screw.

5th. It can be very readily and perfectly adapted to operations on children of any age

First. Because in it the child can be raised as high as needed for the tallest operator.

Second. It provides a comfortable back and head rest, exactly as for grown persons.

Third. The footstool can be lengthened or shortened, to suit children of any size.

6th. The back of the chair can be lengthened or shortened rapidly and at will.

7th. The lower part of the back can be thrown forward to support the small of the patient's back.

8th. The chair, when adjusted to any position, is firm or steady wherever placed, and this is *especially true of the head-rest.*

9th. It occupies less room than any other operating chair.

10th. Although the footstool, when at its extreme length, is much longer than any other made, yet a person of ordinary weight can stand on its extremity without tipping the chair.

Nota Bene.—We have substituted brass cogs and castings, for those that experience has shown in any degree faulty, and the chair, *as now sold, is as strong as any chair made.* Reference is made to this because several of the chairs first sent out, failed in the cogs by which the chair is raised, and in the castings which throw the lower back-pad forward. These have been replaced in every instance with brass cogs, without charge on our part, and to the complete satisfaction of the purchaser.

We are gratified in being able to refer to the commendations, which follow, from some of the leading practitioners of the country.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

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10 W. 11*th St., New York, July* 24*th*, 1873.

MESSRS. JOHNSTON BROS., Broadway:

I find your Morrison Chair gives great satisfaction. My patients all admire, and voluntarily pronounce it the easiest they ever sat in. The movable back-piece, arms and foot-rest, which latter the patients can adjust at pleasure without changing their position, the lowering of the whole chair, which admits stepping into it without the slightest inconvenience, are points which call forth immediate praise from the patients, and give great satisfaction to the operator.

As a child's chair it is invaluable; the little patients can be "put just where you want them," while the operator can with ease change the position of the *whole* chair, without disturbing the patient in the least. These points, combined with others which it has, make this chair the most desirable of any which I have seen. Very respectfully yours, A. L. NORTHROP.

JOHNSTON BROS., *Hartford, June,* 15*th*, 1873.

GENTLEMEN: I have used the new Morrison Chair several hours every day since its arrival here, and feel in duty bound to say that there is no chair manufactured that can compare with it.

Its adaptability to children as well as adults, support for the small of the back—in fact, all its motions are perfect, and I see no chance for improvement. Dr. Morrison and yourselves have my heartfelt thanks for the great benefits you have conferred upon the profession in perfecting the chair as well as the Dental Engine. Very truly yours, GEO. L. PARMELE, M.D., D.M.D.

MESSRS. JOHNSTON BROS., *Hartford, July* 24*th*, 1873.

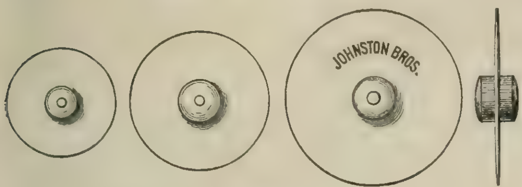
DEAR SIRS: The Morrison Chair meets all my expectations. I like it very much; in fact, I feel perfectly satisfied that I have one of the most complete chairs yet made for the comfort of patients and the convenience of the operator.

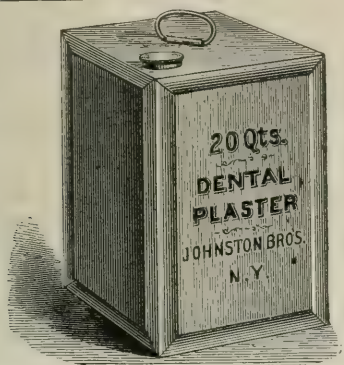
Yours truly, JAS. McMANUS.

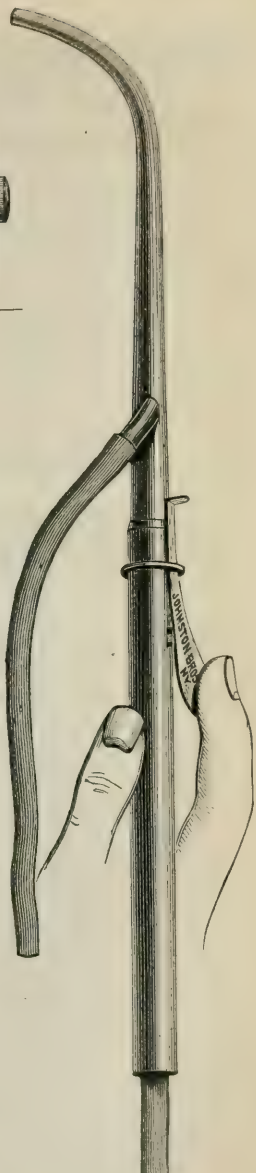
Boxwood Disks for Carrying Polishing Powder.

Four sizes, from $\frac{3}{8}$ to 1 inch in diameter. Prices respectively, 5, 8, 12 and 25 cents each.

JOHNSTON BROS., 812 Broadway.







DENTAL PLASTER IN METAL CASES.

These are each provided with a funnel-shaped mouth in one corner, which is hermetically sealed, through which the plaster can be emptied without injuring the case. This mouth is closed by a screw cap.

4 quart cases, each	$0 60
12 " " "	1 25
20 " " "	2 25

Barrels and half barrels always on hand.

JOHNSTON BROS.,
812 Broadway, New York.

KINGSLEY GAS BLOWPIPE.

Every one sold by us has given satisfaction. It has no equal.

Price	$5 00
" Nickel Plated	5 50

JOHNSTON BROS.

REMODELED

Morrison Dental Engine.

New York, May 25, 1874.

Johnston Brothers.

Gentlemen:—You ask my opinion of the Remodeled Engine:

I have now used mine two weeks, and would say that its advantages to the operator over the old style are nearly as obvious as were those of the first Engine over hand work. John T. Metcalf.

The cut on the following page well illustrates the new Engine, and, with the subjoined description, will make the alterations plain to all.

DESCRIPTION.

1st. The rocking movement of the upright standard is abandoned, and a rigid, handsomely plated, and tapering column substituted.

2d. From the top of this column extends an arm directly in front of the patient. This arm swivels upon the column, and is adjustable vertically, being secured by a brace at any height desired, thus bringing its end directly in front of the patient's mouth, whatever be the height of the operating chair.

3d. Attached to the end of the adjustable arm by a most ingenious universal joint, is a shaft about twelve inches long (corresponding to the extension arm of the old engine), which carries at its end the handpiece.

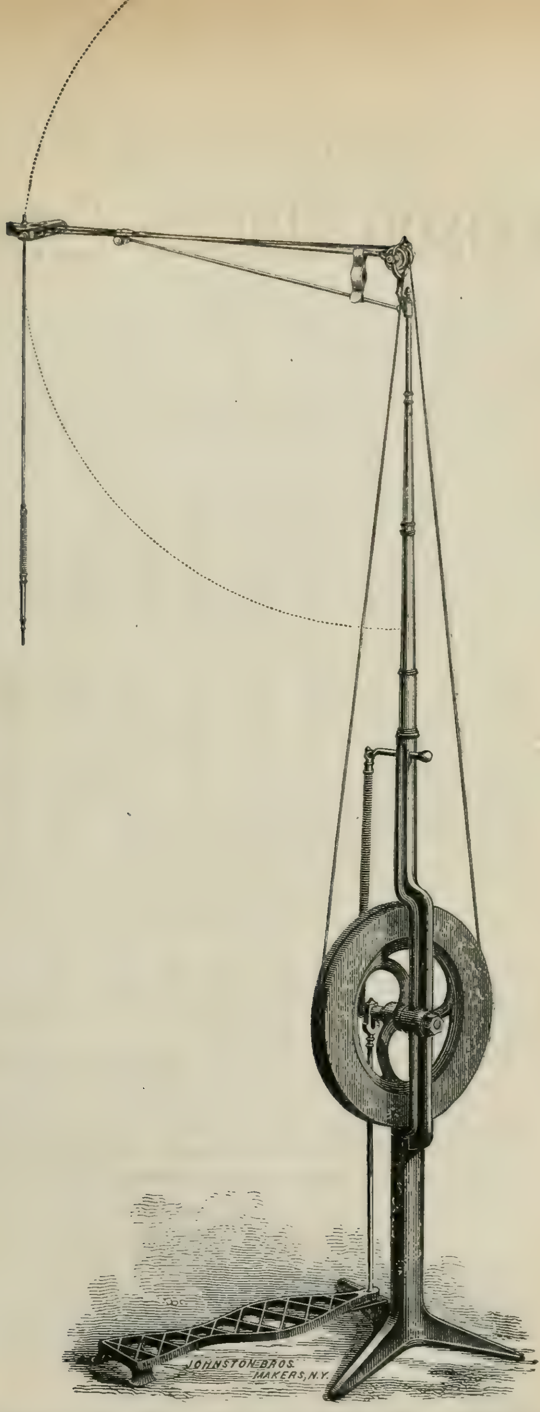
- *a.* This shaft, being short, is much lighter than the old one, enabling the operator more perfectly to feel his work, and is also less liable to tremor.
- *b.* Both sides of the mouth may be reached without changing the position of the engine.
- *c.* By lowering or raising the adjustable arm, according as the operation is upon the superior or inferior teeth, the driving spring is but slightly flexed, and great steadiness secured.

4th. The off-centre spring is attached above the driving wheel, partially supporting it and reducing the friction.

5th. The handpiece is much smaller, and the burs so secured that they may revolve in either direction, and at the same time be used either with a pushing or pulling cut, and this without the use of a catch spring. Old style burs can be refitted to this handpiece.

The model engine of this pattern, as above described, has been for several weeks in use in the hands of one of the best operators in our city, and is pronounced by him a very decided improvement.

JOHNSTON BROS.



REMODELED MORRISON ENGINE.

Price, $60. Right Angle Attachment, $5. Boxing, $2.

JOHNSTON BROTHERS,

Dental Depot,

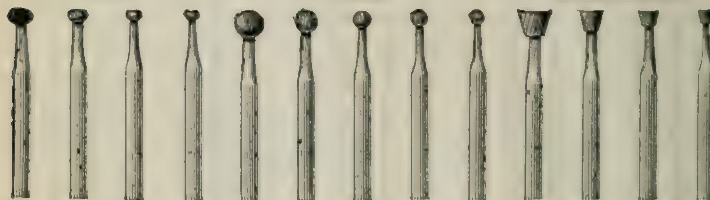
812 BROADWAY, NEW YORK.

Equipment for Morrison's Dental Engine.

PLUG FINISHING BURS.

1

OVAL. ROUND. INVERTED CONE.



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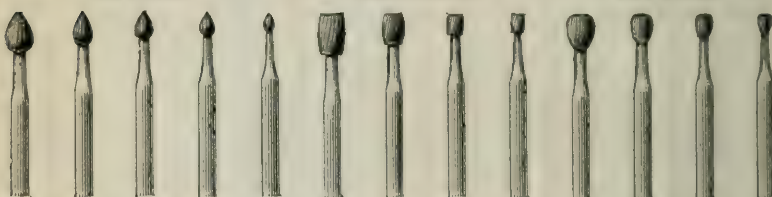
BUD SHAPED. BARREL SHAPED. PEAR SHAPED.



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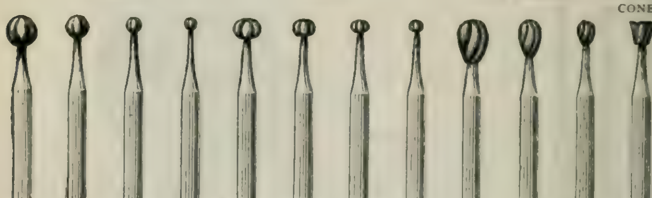
BURNISHERS.

ROUND. OVAL. PEAR SHAPED. INVERTED CONE.



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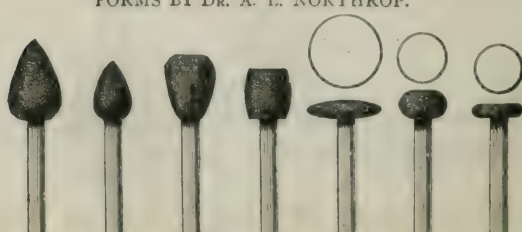
CORUNDUM POINTS FOR MORRISON ENGINE.

FORMS BY DR. A. L. NORTHROP.



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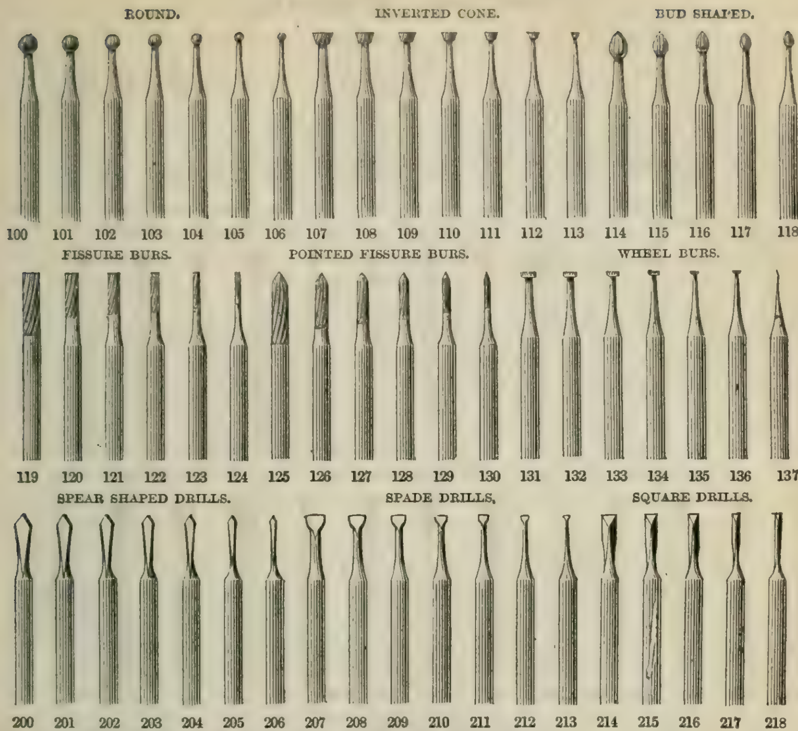
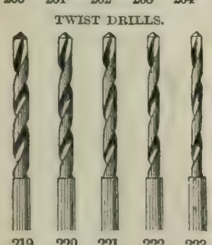
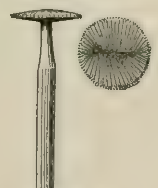
CAVITY INSTRUMENTS.







Price, $1.25.

CAVITY INSTRUMENTS FOR RIGHT ANGLE ATTACHMENT.

We have in stock, and can furnish *Cavity Instruments* for the *Right Angle Attachment*, of all styles and sizes, from Nos. 100 to 218, inclusive.

SCOTCH STONES, MOUNTED.

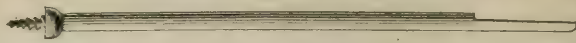
The Scotch Stones enable the operator to give a finish to fillings hitherto unattainable, and only need a trial to be appreciated. We have these in stock of forms Nos. 75, 77, 80 and round. Other kinds of stones are now in process of manufacture.

HINDOOSTAN STONES, MOUNTED.

Forms of Nos. 75, 77, 80, and round. Of each shape we make three sizes. The cuts referred to by the numbers represent the large size. These are, beyond doubt, of the greatest utility in cutting either gold or bone. They last longer than any other stone.

LEATHERS, MOUNTED.

We have in stock Leather Points mounted on Mandrils, of forms Nos. 75, 77, 80 and round, designed to be charged with powders, for polishing and finishing fillings.



Screw Mandril, to be armed with leather, wood, etc., for polishing fillings, cleaning teeth, finishing plates, etc.

PRICES.

Finishing Burs,	Per dozen,	$6 00
Stoned Finishing Burs,	Each,	1 00
Cavity Instruments and Screw Mandril,	Per dozen,	3 00
Stoned Cavity Burs,	Each,	50
Right Angle Cavity Instruments,	Per dozen,	3 00
Leathers, Mounted,	"	3 00
Hindoostan Stones, Mounted,	"	6 00
Scotch Stones, Mounted,	"	3 60
Burnishers,	"	9 00
"	Each,	0 75
Corundum Points, Mounted,	Per dozen,	1 50
" " not Mounted,	"	0 75
Bands for Engine,	"	1 50
Twist Drills	Each,	40

IN ORDERING INSTRUMENTS, DESIGNATE THEM BY THEIR NUMBERS, AND STATE WHETHER THEY ARE WANTED TO FIT THE (A,) (B,) OR (C) HAND-PIECE.

Hand Piece, Style A.

Hand Piece, Style B.

Hand Piece, Style C.

We can alter A or B burs to style C, at 25 cents per dozen.

When sending burs by merchandise mail for alteration or repair, attach your *card* or *printed address* to the outside of the package—do not write it. Send at same time a letter containing your count of the burs, and directing the disposition you wish made of them.

☞ Our instruments are all made of the best Stubs' steel. We shall spare no effort to make them equal in every respect to anything offered to the profession.

☞ We are constantly adding new forms and sizes of Plug Finishing Burs, Cavity Instruments, Drills, etc.

DIRECTIONS FOR USING THE ENGINE.

1. In lifting the engine, be sure *not to bend* the arm which carries the hand piece.

2. Whenever the least noise is heard, oil the engine with the best sperm oil. The rapidity of motion renders oil a necessity.

3. The only part at all likely to break, is the small spring, which conveys power at the upper end of the hand piece. It is not soldered to the shaft, but is slipped on by hand. To put on a new spring, take hold of it near the end opposite that you apply to the shaft, and twist as if to *uncoil* the spring, at the same time pushing the spring on to the shaft. You will be greatly aided in removing the broken parts, by twisting, as if to uncoil, the spring. A piece of emory paper will be found convenient to aid in holding the polished shaft.

4. The engine, to run satisfactorily, should be oiled daily ; and the driving-spring should be perfectly straight.

IMPROVED INSTRUMENTS.

We have added to our list three new and very popular sizes of Cavity Burs. One round called 106½, one inverted cone called 113½, one wheel-shaped called 137½. Each is smaller than any before made by us, of its shape. These numbers are neatly put up in dozen and half dozen packages, and are completely protected from oxidation and from rubbing against each other in transportation.

They are very popular, and we frequently receive orders from dentists for from one to three dozen of each.

STONED BURS FOR BURRING ENGINES.—For some time past, we have made to order, a Bur for use in Burring Engines, by the following process : The teeth of the Bur being laid out with extreme accuracy, are filed to *exactly the same length,* but are not brought to a cutting edge. The Bur is now tempered, and each tooth *afterwards stoned to a fine edge.* This secures a Bur perfect in all its cutting edges, and unequaled by anything hitherto offered in the market. Of these we are provided with a limited supply, of both Cavity and Finishing Burs, excepting Fissure *Burs.* (See Price List.)

Thin Boxwood Discs for carrying Polishing Powder, to polish fillings in proximal cavities. These are of four sizes, from ⅝ inch to 1 inch diameter.

We add that the Instrument-stand, elsewhere illustrated, will be found very useful for the convenient keeping of the Engine Instruments while not in actual use.

Besides the form represented in the cut, we have them with smaller holes, and very many more of them, so that each Bur may be kept by itself.

We invite the fullest examination of our Engine Instruments, as regards

The quality of the steel from which they are made.

The shape and finish of the cutting edge.

Their temper.

The rapidity with which they cut.

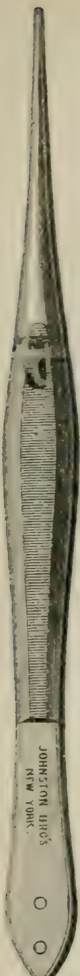
Their durability.

The shaft of each instrument is *round and highly finished,* and can therefore be used without unreasonable and unnecessary injury to the nose of the hand-piece, which injury occasions unsteadiness in all the uses of the Engine.

They will *bear* examination in *quality* and *price.*

JOHNSTON BROS.

BOGUE'S TAPE FORCEP.



These are designed for *firmly* grasping corundum or silex tape, or floss silk, when it is desired to use either of them in the mouth, for inserting or removing tape, rubber wedges, etc., or for grasping arteries, pendulous portions of the gum or other parts during amputation. The points are so formed that they interlock in the substance of the material to which they are applied; and, when they have once taken hold, a spring-catch in the side of the forceps fastens them in position, so that it is impossible for them to slip. They render it almost unnecessary to handle tape or floss silk with the fingers in a patient's mouth.

They are also convenient when one wishes to withdraw silk or gilling twine which has become fastened between the teeth, or to remove wet napkins or wooden wedges.

Price, Nickel-plated................$2 75

JOHNSTON BROS.,

812 Broadway, N. Y.

Ives' Tongue and Cheek Protectors.

These admirable little instruments are a protection to the patient, the operator, and to the disc.

They are of two sizes, and together will answer for Arthur's disks of any usual size.

The lips which clasp the nose of the hand-piece are left soft, and can be spread or contracted to snugly fit the A, B, or C hand-piece.

Price, per set............................$3 00
Each.................................... 1 50

JOHNSTON BROS.

LIQUID NITROUS OXIDE.

[Revised Circular.]

The increased and still increasing demand for Pure Liquid Nitrous Oxide, and for information concerning apparatus for its exhibition, renders it necessary that we issue yet another edition of our circular upon that subject As the Surgeon's Case, as first introduced, has proved itself in every way all that we could wish it to be for the place assigned to it, we cannot do better than to repeat here our first description of it.

SURGEON'S CASE.

This comprises a strong cylinder containing One Hundred Gallons of Gas, a strong morocco covered case, provided with an iron ring and set screw, by which the iron cylinder is held in place during use, and its delicate valve protected from injury; also, a rubber bag with rubber tube at one end for admission of gas, while an inhaling tube, handsomely covered on its outside, and provided against any possibility of a collapse by a tin-coated spiral of wire on its inside, is fastened at its opposite end—an inhaler—a nickel-plated wrench and a nickel-plated key. In fact, *all* the apparatus necessary for administering the gas. The whole case and contents weighs about fifteen pounds. This is here shown as open, and the bag which receives the gas from the cylinder, and from which it is exhibited to the patient, is represented as filled, and suspended above the case. The cylinder is also shown as standing at the side of the case. This is the simplest and most popular form of apparatus, and will be everywhere welcomed—because of its portability for use outside of the operating room.

REVISED PRICES.

Complete Apparatus — Surgeon's Case, with Metallic Inhaler. . . . . **No. 1.**	$42 00
Complete Apparatus—Surgeon's Case, with extra sized Bag and Metallic Inhaler. . . . . **No. 2.**	45 00

Boxing either, $1.00.

Each complete apparatus includes a 100 gallon cylinder, filled with Liquid Nitrous Oxide.

Cylinder with 100 gallons of Gas.	16 00
Refilling Cylinder.	6 00
Morocco covered case, with ring and thumb screw, velvet lined,	12 00
Polished bl'k walnut " " " " "	13 00

Of these latter we have only a limited number.

Rubber Bag, with covered inhaler tubing, (about 4 gall. capacity)	5 00
Rubber Bag, with covered inhaler tubing, extra size.	7 00
Inhaler, with spring valves, trumpet mouth-piece, with Plated connection.	8 50
Inhaler, latest style, with two way stop cock, adapted to the use of both dentists and surgeons, with connection.	9 50
Key, Nickel Plated.	1 50
Wrench, "	50
Union, Nickel Plated, (nut and tube), for connecting cylinder and gas bag.	1 50
Covered Inhaler Tubing, per foot.	50
Plated Connection to fit old style Inhaler.	1 00

REMARKS.

When the side of a bag has been perforated, it cannot be repaired, but should be replaced. Send on the tubing by mail, and the bag will be replaced. Price. 3 00

As this cannot be done *properly* except by the use of rubber cement, and by persons experienced in the business, we think it every way advisable that it be entrusted to the rubber workers, and not attempted by the dentist.

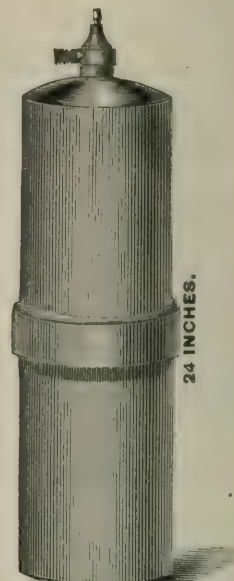
JOHNSTON BROS.,

812 BROADWAY, N. Y.

ONE THOUSAND 1000 GALLONS GAS,

LIQUID NITROUS OXIDE.

1000 GALLON CYLINDER CASE.
Price, $30.00. Boxing, $2.00.



1000 GALLON CYLINDER.
Price, $36.00.
Boxing, $1.50.

Gas in 1000 gallon lots, 4½ cents per gallon.

The above illustrated apparatus is especially desirable where large quantities of nitrous oxide are used, or where it must be sent a great distance. In this form it is best to ship it by *fast freight*—which makes the cost of transportation very light.

THE GAS CAN BE KEPT FOR ANY LENGTH OF TIME,

AND IS

CONSTANTLY ON HAND AND ALWAYS OF THE BEST QUALITY.

PRICE LIST OF A COMPLETE OUTFIT.

1 Black Walnut Paneled Case, octagonal	$30 00
2 1000 gallon Cylinders at $36 00	72 00
2000 gallons of Gas at 4½ cents per gallon, being 25 per cent. less than price in small cylinders	90 00
1 Bag, with covered Inhaler Tubing	5 00
1 Bag, extra size, with covered Inhaler Tubing	7 00
1 Key, Nickel Plated	1 50
1 Wrench, Nickel Plated	50
1 Union, " "	1 50
1 Inhaler—Metallic—with two way stop-cock and connection	9 50
	$217 00
Deduct Gas	90 00
Cost of Apparatus	$127 00

By purchasing under this plan a saving of 25 per cent. is effected in the cost of the gas, or on 2,000 gallons of $30.00.

It is right that we should here announce that we have in hand a piece of furniture, which—while it will answer the purpose of the black walnut case illustrated—will also serve as a stand for an ornamental Gasometer.

A cut of it will appear in an early issue of the DENTAL MISCELLANY.

As these large cylinders can easily be sent by fast freight (*the* 100 *gallon size is too small to be so risked*) cost of transportation is reduced to its lowest rate.

JOHNSTON BROTHERS,

812 Broadway, New York.

PORCELAIN TEETH.

Our stock is carefully selected from the factories of the BEST MAKERS, and embraces all of the varieties in use, including Continuous Gum Teeth. We will fill orders on short notice for any manufacture of teeth.

Dentists sending us their orders can rely on receiving prompt attention, and on getting manufacturers' best rates.

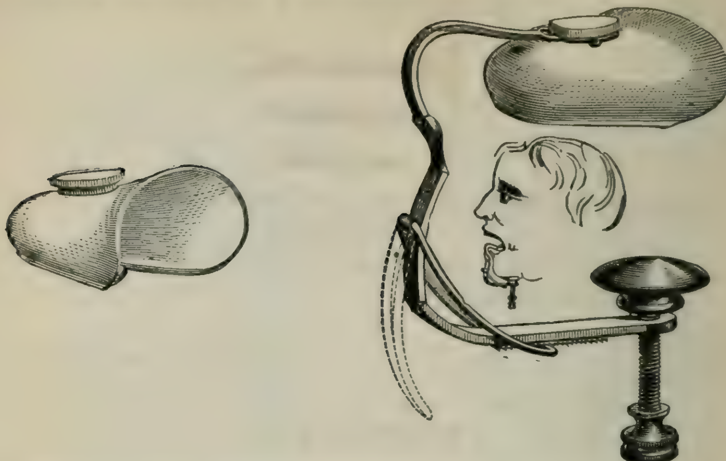
JOHNSTON BROTHERS.

DENTAL GUM—RED.

Johnston Bros.' Nos. 1 and 2, per lb	$2 50
E. Dougherty's Nos. 1 and 2, per lb	2 75
American Hard Rubber Company's, per lb	2 50
Whalebone Rubber, per lb	3 50
Dental Gum—black—per lb	3 00
Gutta Percha, per lb	3 00

JOHNSTON BROTHERS.

OSBORN'S TONGUE HOLDER.



Osborn's Tongue Holder and Duct Compressor. Is Cleanly, and Reflects Light In the Mouth.

This is by far the best Tongue Holder and Duct Compressor ever offered to the profession. The cut exhibits one adjusted as when in the mouth, also a view of one in use.

It possesses the following advantages, in addition to those of other apparatus designed for the same purpose.

1st. It covers the tongue, and so completely protects it from accident, while at the same time permitting to the patient some chance for changing its position *inside of the cup.*

2d. The cup which covers the tongue being of the finest white porcelain, *reflects light in the mouth*, and so *greatly* aids the operator.

3d. The cups can be readily and perfectly washed, and the use of the apparatus is therefore far less objectionable to the patient than is that of the ordinary metallic tongue holder.

4th. This apparatus is so readily applied that it is often used when the application of rubber dam would be difficult, or require considerable time. The cup pressing upon a pledget of spunk or bibulous paper nicely placed upon the ducts effectually prevents the flow of saliva.

It is recommended by Drs. William H. Allen, W. C., Bennett, and Frank Abbott, of New York city, and C. Fones, of Bridgeport, Conn.

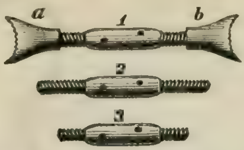
PRICES.

Complete, with three porcelain cups	$10 00
Sets of three cups	4 00
Single cups	1 50

JOHNSTON BROTHERS.

JACK SCREWS.

Devised by Dr. C. S. LONGSTREET, with Dr. A. McCOLLOM's Improved Head.



This device is greatly prized by those who have used it.

PRICES.

Full Set, as above, Nickel Plated, screw and two extra bars	$2 50
Jack Screw, Nickel Plated	1 50
Bars, " " each	50

JOHNSTON BROTHERS.

FLOSS SILK.

That recently made for us is unsurpassed in purity, in fineness of fiber and in uniformity. Each spool contains twelve yards.

Price per spool	$ .15
Price per dozen	1 50

A liberal discount to Dental Depots and Druggists.

JOHNSTON BROTHERS.

TOOTH POWDER.

A good saponaceous article.

Price in bulk, per pound	$1 00
Five pound lots	4 00

JOHNSTON BROTHERS.

ROYCE TOOTH POWDER. (Excellent.)

Per pound	$ .75
Five pound lots	2 50

JOHNSTON BROTHERS.

STYPTIC COTTON.

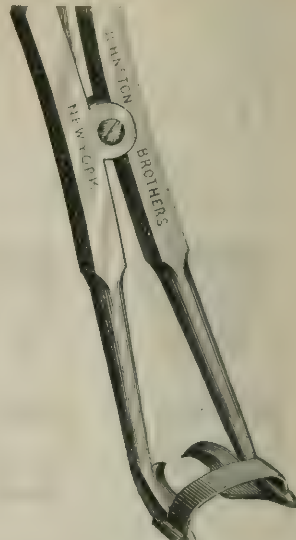
A most excellent article to staunch the flow of blood.

Per box	$ .30

JOHNSTON BROTHERS.

RUBBER DAM CLAMP FORCEPS.

Of these we offer two styles, both deservedly popular.



POINTS OF DR. T. C. ROYCE'S

Rubber Dam Clamp Forceps,

Shown with Clamp. Handles are exactly like the other style, (Bowman's.)

Both styles of these Forceps have points accurately adapted to the shape of the clamp at the neck, and hence will be found much more convenient than those hitherto offered the profession in this point of adaptation. (See also advertisement of Clamps.)

If so ordered we can supply either style of Forcep with a band, which will keep the Forcep and Clamp extended and ready for use when the hand of the operator is removed, as shown on the Bowman Forcep.

PRICES.

Forcep, either style	$3.00
" " " Nickel Plated	3.50
Complete set of Clamps, embracing eight forms	4.00
Complete set of Clamps, embracing eight forms, plated	4.50
Clamps, each	.50
" " plated	.60

JOHNSTON BROS.

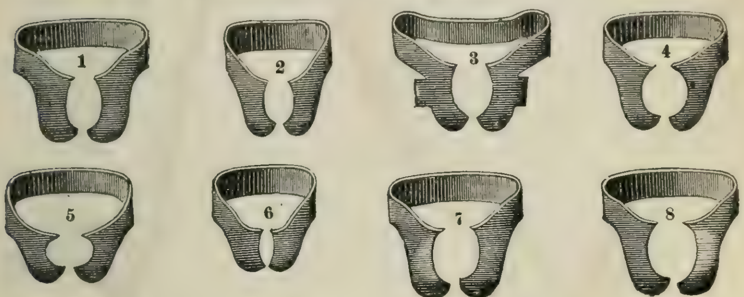
We were never more sure of doing signal service to the Dental Profession than now in offering the

IMPROVED

Rubber Dam Clamps,

INVENTION OF

DR. DELOS PALMER, OF NEW YORK.



Price, set of Eight,	Oil finish,	$4.00.	Each plain,	50 Cents.
	Nickel plated,	4.80.	" Nickeled,	60

For use with Rubber Dam Clamp Forceps.

These Clamps are designed to be placed on the tooth at the commencement of the operation. Afterwards apply the Rubber Dam by passing it over both tooth and clamp.

DESCRIPTION.

Nos. 1 and 2.—Universal Clamp for Molars.

No. 3.—For posterior cavities in molars standing alone.

No. 4.—For third molars, or any molar of a cone shape. This Clamp can oftentimes be turned around while on the tooth, so as to place the bow of the Clamp out of the way of the operator.

No. 5.—For biscuspeds.

No. 6.—For lateral and central incisors.

Nos. 7 and 8.—Rights and Lefts.—For cavities under the gum, on the buccal or lingual surface of molars.

Cuts of two favorite styles of Rubber Dam Clamp Forceps will be found on another page.

These Clamps have prominent points of marked superiority over those of other manufacturers.

First. Each has been carefully adapted to the shape of the tooth for which it is designed, *under the personal supervision of Dr. Delos Palmer*, the inventor.

Second. A groove is made by us in the clamp, into which the forcep nicely fits, so that the clamps firmly hold their position on the forceps, when once adjusted, instead of tilting from one position to another—as is the case when no groove is provided.

JOHNSTON BROS.

Morrison Chair—Rotary Movement.

To secure the advantage of this movement for the Morrison Chair, we have provided for it a new style of legs, having broad, ornamented feet. A gun metal roller is let into each of these feet, so arranged that the rollers on the front feet will roll laterally (in the arc of a circle), but not forwards or backwards; and a cam-lock is provided which fastens them in any desired position. This makes it easy to turn the patient to the light. As the front rollers can be locked in position, the operator can use any force he finds necessary in the mouth of the patient without liability of moving the chair in the least.

If it is desired to move the chair from its position (to clean the room) it is only necessary to lift the front rollers from the floor, and the chair rolls easily backwards or forwards on the rollers in the back feet.

PRICES.

Morrison Chair	$150 00
Morrison Chair with rollers and cam-lock	160 00
A new set of legs	25 00
Spittoon attachment	8 00

JOHNSTON BROTHERS.

Rosewood Bracket Table.

This is built up of rosewood veneers, and is highly polished. It is fourteen inches square, and provided with drawers about five-eighth inch deep, which are lined throughout with soft leather. The table is covered with a beautiful article of silk velvet. It is by far the most beautiful table we have seen.

PRICES.

Bracket, with rosewood table	$40 00
Rosewood table	17 00

JOHNSTON BROTHERS.

NOTICE.

We have filled all orders received for head-gear as per our previous announcement, and now withdraw the offer.

We find that the present head-gear requires, for the best work, a heavier standard than that on the earlier style of engine. If any insist on altering their old engine, our price for the head-gear (in exchange for the old head-gear) will be $20.00. Price of either B or C style hand-piece, $5.00. Right angle, either B or C style, $5.00.

JOHNSTON BROTHERS.

NEW YORK COLLEGE OF DENTISTRY,

NINTH ANNUAL SESSION,

1874-75.

FACULTY

WM. H. ALLEN, Emeritus Professor of the Institutes of Dentistry.

FANEUIL D. WEISSE, M. D., Professor of Regional Anatomy and General Pathology.

FRANK ABBOTT, M.D., Professor of Operative Dentistry and Oral Surgery.

ALEX. W. STEIN, M.D., Professor of Histology, Visceral Anatomy, and Physiology.

F. LE ROY SATTERLEE, M.D., Professor of Chemistry, Materia Medica, and Therapeutics.

C. A. MARVIN, D.D.S., Professor of Mechanical Dentistry.

D. W. WILLIAMSON, D.D.S., Demonstrator of Operative Dentistry.

A. RUST CUYLER, D.D.S., Demonstrator of Mechanical Dentistry.

C. P. KREIZER, M.D., Assistant to the Professor of Chemistry, etc.

Students may matriculate at any time, as the Infirmary is open, for regular students of the College to practice in, the entire year.

The regular course of Lectures will commence middle of October, 1874, and continue until the 1st of March. Three hours of each day of the week (except Saturday) will be devoted to lectures, and four hours to *Clinics*, and practice at the Chair, and in the Laboratory, under the direction of the Demonstrators.

It is with pleasure that we call attention to the removal of the College to more spacious, more convenient and permanent quarters. Our Infirmary is furnished with thirty good chairs and all the appliances. Our Lecture-room will seat, and our Laboratory will accommodate, two hundred students; all on one floor, and up one flight of stairs only.

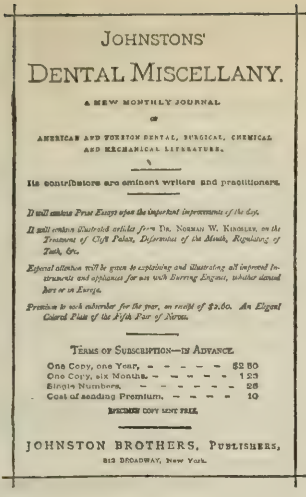
Tickets for one year's Instruction, including Course of Lectures, Matriculation, Demonstrators', Diploma Fees, and Practice in the Infirmary the seven and one-half months between the sessions...	**$150.00**
For the Course of Lectures only.......	**100.00**
Matriculation (paid but once).......	**5.00**
Graduation Fees.......	**30.00**

Board may be obtained for from $4 to $8 per week.

For further information address

FRANK ABBOTT, M. D., Dean,

78 West Twelfth Street, New York.



JOHNSTONS'

DENTAL MISCELLANY.

A NEW MONTHLY JOURNAL

OF

AMERICAN AND FOREIGN DENTAL, SURGICAL, CHEMICAL AND MECHANICAL LITERATURE.

Its contributors are eminent writers and practitioners.

It will contain Prize Essays upon the important improvements of the day.

It will contain illustrated articles from DR. NORMAN W. KINGSLEY, *on the Treatment of Cleft Palate, Deformities of the Mouth, Regulating of Teeth, &c.*

Especial attention will be given to explaining and illustrating all improved Instruments and appliances for use with Burring Engines, whether devised here or in Europe.

Premium to each subscriber for the year, on receipt of $2.60. An Elegant Colored Plate of the Fifth Pair of Nerves.

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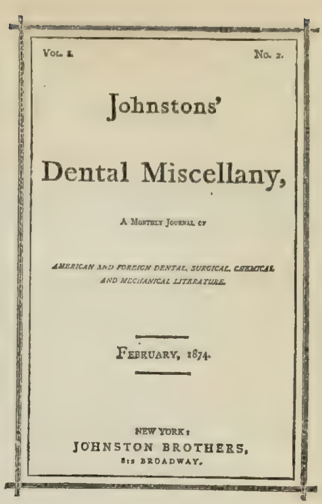
812 BROADWAY, New York.



VOL. I. No. 2.

Johnstons'

Dental Miscellany,

A MONTHLY JOURNAL OF

AMERICAN AND FOREIGN DENTAL, SURGICAL, CHEMICAL AND MECHANICAL LITERATURE.

FEBRUARY, 1874.

NEW YORK:

JOHNSTON BROTHERS,

812 BROADWAY.

IMPROVED TRIPLEX RUBBER-DAM PUNCH.

DEVISED BY DR. F. W. DOLBEARE.

1st. It has in convenient form for use three sizes of punches.

2d. If one size breaks it can be replaced (by mail) at trifling expense.

3d. It is nickel-plated, and so easily kept in order.

JOHNSTON BROS.,

812 Broadway, N. Y.

SECOND-HAND CHAIRS.

Dentists who have supplied themselves with the Morrison Chair frequently request us to sell the chairs previously used by them. We therefore can ordinarily supply, at cheap rates, second-hand chairs of any of the varieties hitherto most used. For particulars, address

JOHNSTON BROS.,

812 Broadway, N. Y.

SICKLE SCALERS.

A set of these consists of four instruments of the shape here represented, but with blades of varying thickness.

The blades are hardened and the edges ground square; this renders the instrument equally serviceable as a scaler or a chisel, as it has four cutting edges. No. 4, being very thin and flexible, can be inserted between the teeth.

A VERY USEFUL SET OF INSTRUMENTS.

No. 1 has a stiff blade.

No. 2 has a less stiff blade.

No. 3 has a blade that is quite flexible.

No. 4 has a blade that is very flexible.

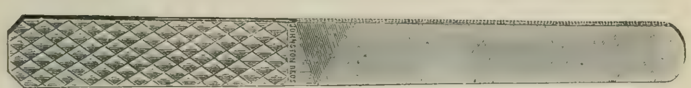
PRICES.

Set complete	$2 00
Single Instrument	50

JOHNSTON BROS.,
812 Broadway, N. Y.

SEPARATING FILES.

Maynard's Patent, May 26, 1874.



These are of the finest quality of steel, and most carefully cut.

We believe them equal to any separating file made, either here or in Europe.

They are made with Maynard's improved handle, which renders it much easier to hold them firmly, and reduces the chance of breakage.

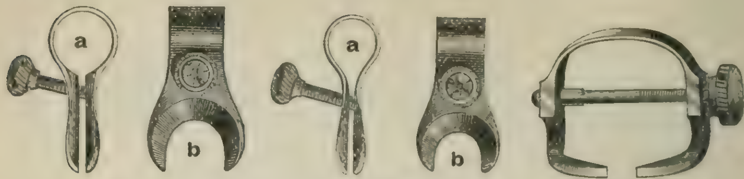
PRICES.

No. 00,	**per doz**	**$1 50**
No. 0,	"	**1 50**
No. 1 to 6,	"	**1 25**
Assorted,	"	**1 25**

We have on hand former styles at usual prices.

JOHNSTON BROS.,
812 Broadway, N. Y.

Jarvis' Separators.



No. 1. **No. 2.** **No. 3.**

The cuts above shown are full size, and represent an apparatus for separating teeth. It is almost impossible to overstate the value and convenience of the devices. By their use, without delay to the operator or appreciable pain to the patient, adjacent teeth may be forced apart for any of the various purposes for which it has been customary to wedge teeth. Crowded teeth can be readily parted by using the separators, so that rubber dam can be applied without difficulty or loss of time. Two forms are shown by the cuts ; of the first form we make two sizes, **No. 1** and **No. 2.**

The Separator consists of a piece of steel, nickel-plated, bent upon itself, having the two ends formed to fit the outer portions of the proximate surfaces of two adjoining crowns.

These jaws are forced apart by the action of a screw, which passes through one and against the other of them. This form is applicable to all the bicuspids and molars. It does not touch the gums or injure the teeth, neither does it cause pain sufficient to be of consequence. The whole instrument is drawn to a spring temper. The jaws are thin, in order to be out of the way, and also the more perfectly to adapt themselves to the surfaces of the crowns of the teeth than if they were rigid. The appliance may be left on, in many cases, while operating, or if removed the space gained by its use may be retained by inserting a wooden wedge.

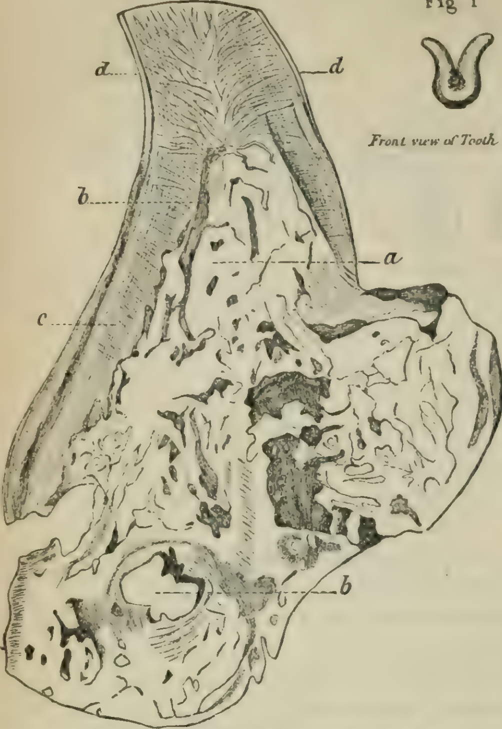
The Compound Wedge, No. 3, consists of two wedges approaching or passing each other. This is especially applicable to the incisor teeth, and will be found particularly useful in making room for passing rubber dam around crowded teeth. In use, a small strip of wood should be placed over the teeth and beneath the cross-bar, to prevent the points from sliding towards the gum.

PRICES.

Complete Set of Three	$6.00
Any Single Instrument	3.00

JOHNSTON BROS.,
812 Broadway, N. Y.

Fig. IV



Vertical Section of side of Tooth shewing body of Tooth and portion of Denticle magnified 24 Diameters
a. Osteo-Dentine b. Medullary Canals. c. Dentine with Calcigerous Tubes. d. Dentine somewhat resembling Enamel.

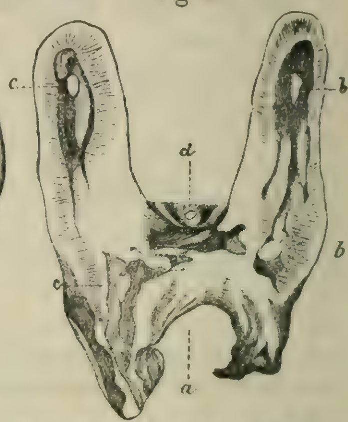
Fig. I

Front view of Tooth Nat. size.

Fig. II

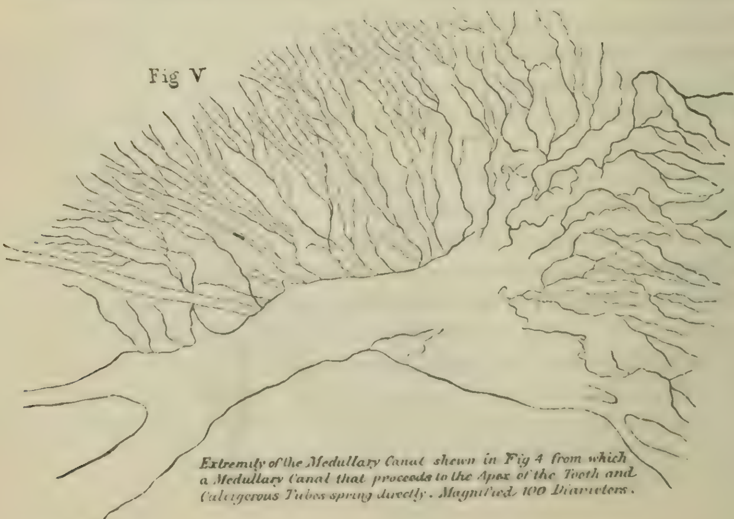
Side view of Denticle Nat. size

Fig. III



Vertical section of Fig 1 Magnified 24 Diameters
a. Remains of Medullary Canal b. Medullary Canal with radiating Calcigerous Tubes.
c. Medullary Canal only partially exposed by section. d. Portion of third Denticle.

Fig V



Extremity of the Medullary Canal shewn in Fig 4 from which a Medullary Canal that proceeds to the Apex of the Tooth and Calcigerous Tubes spring directly. Magnified 100 Diameters.

JOHNSTON'S

Dental Miscellany.

VOL. I.——*NOVEMBER, 1874.*——No. 11.

PRESERVING THE TEETH.

By O. A. JARVIS, M.D.S.

Read before the State Society, June, 1874, and published by permission.

1. Our object ought to be to preserve the teeth.
2. We make it our business to repair them.
3. Prevention, the most effectual and practical means for preserving them.

There is a kindly spirit and a beautiful philosophy in the very idea of a Society for the Prevention of Cruelty to Animals.

This cruelty has its origin in the ignorance as well as the moral ugliness of men. But a society for the repair of broken limbs would find its necessity in the accidents of men. Accidents are almost inevitable. They are expected; but not to occur too often, or under the same circumstances. Accidents arise from lack of experience, and uncontrollable circumstances. Sickness may be an accident, or it may be the result of a known, persistent, willful violation of the laws of health. This, including ignorance, is the origin of the diseases of the teeth, and not a matter of accident. But we may safely presume that *now* the ignorance of either the dentist or the patient as to their respective duties may no longer be winked at or excused.

The mission of the profession, as a profession, is to save the teeth. And to show that prevention is the proper and most effectual means to accomplish this, is my present object.

Now, some individual members of the profession may have no such object. Others may have varying degrees of selfishness.

If we say the mission of the profession is to save the teeth, we have a

purpose which is noble, worthy, inspiring, like saving the soul, rather than praying it out or buying it out of purgatory ; like preventing fire, rather than putting it out ; like preserving health, rather than curing disease.

He is the wisest man who seeks counsel before he commits any infraction of the law. And that lawyer better meets the obligations and sustains the dignity of his profession, who guides his client safely within the protection of the statutes, rather than endeavoring to shield him from the consequences of their violation. Yet I will not require of any man about to enter the ranks, that his ruling motive be to do good to his fellow mortals, and that that motive take the precedence over all others. I will even permit him to confess that his prevailing motive is to find a business by which to provide for his own wants, and the wants of present or prospective dependents. But I will require, and without any abatement of accountability, that when he learns by what means within the range of his profession he can *best* serve his kind ; that by pursuing a certain course he can confer a greater boon upon suffering humanity, he shall advocate and practice according to the convictions and the light he has attained. Like the soldier, though he may have enlisted for a money consideration, yet when once in the battle he is bound to give his life for his country.

If he is even compelled to trade in a cheaper material he must not declare it the best in the market. He owes it to humanity ; he owes it to the dignity of his profession ; and his own self-respect, and sense of right, should compel him to proclaim the existence and availability of something better.

Dentists, as a class, are looked upon as being a little erratic, and inclined to soar. They are all known to be inventors. They are unrestrained in their aspirations and attempts in the field of unsolved problems.

Now, these struggling aspirations are laudable, sublime ; but, being misdirected, sink into a carious tooth, to repair which is the end of all desire.

If all the clergy were to preach the golden rule until the lesson was understood and reduced to practice by those who profess to admire it, then the genuine gospel would be accepted with avidity. The comparison holds good in the confession that the golden rule put in practice would bring the millennium. But then the precept is so plain that it does not need any teaching, and being universally conceded it is presumed everybody will act according to their convictions. Hence it is

supposed there is no honor in that direction. Fame is found only by delving in the mysteries of the unknown. So with us. To teach this golden rule of our profession would involve so much of nursery practice as to lower our dignity, and be so simple as to prevent all possibility of renown.

We do attempt to go into the nursery now, to order the food of the infant, and regulate the dietetices of the mother. This is well. But while there, let us not neglect the simpler, more practical, and more important duties.

At present a great deal of attention is given to the training of nurses. The babies have found out that they can better do without the doctors than they can without the nurses. Let us take warning.

That I may not seem entirely alone in the novelty and simplicity of my subject, as well as to show the inevitable drift of popular education, permit me to make just one quotation :

"OUR TEETH.—They decay. Hence unseemly mouths, bad breath, imperfect mastication. Everybody regrets it. What is the cause? I reply, want of cleanliness. A clean tooth never decays. The mouth is a warm place—98 degrees. Particles of meat between the teeth decompose. Gums and teeth must suffer. Perfect cleanliness will preserve the teeth to old age. How shall it be secured? Use a quill pick, and rinse the mouth after eating. Brush and Castile soap every morning; the brush with simple water on going to bed. Bestow this trifling care upon your precious teeth, and you will keep them and ruin the dentists. Neglect it, and you will be sorry all your lives. Children forget. Watch them. The first teeth determine the character of the second set. Give them equal care. Sugar, acids, saleratus, and hot things are nothing when compared with food decomposing between the teeth. Mercurialization may loosen the teeth, long use may wear them out, but keep them clean and they will never decay. This advice is worth more than thousands of dollars to every boy and girl. Books have been written on the subject. This brief article contains all that is essential."—*Dio Lewis.*

Some of the more kiting kind of dentists have claimed for our profession superiority to the medical. This claim may for a time be made good, if we plant ourselves upon this firm rock of everlasting truth, and teach prevention with more earnest than cure, the lack of which teaching has ever been a reproach to the medical profession. It should be taught with so much earnestness and unselfishness as to reduce all reparative and substantive treatment to comparatively minor importance.

Isn't it a fact? Yes. Have we taught it as a fact? No. We have rather made it our business to repair and substitute. Please understand me; everything which has been done in this direction ought to have been done; but the other should not have been left undone. During the reign of a succession of Roman Emperors, the seat of empire was left comparatively unprotected, indulging in luxury and resting in fancied security, while the emperor and the army were manœuvering upon the borders, or pursuing the enemy into unexplored regions, until Aurelian, upon the distant Danube, is alarmed by reports that the Allemanni are marching in overwhelming force upon the imperial city.

If the people leave the protection and care of the teeth with us, it is because we have taught them to do so. But we must remember they have a right to expect from us fuller and more perfect instruction. And if in the past they have responded only to pressure upon the nerves, it is time, in the progress of development, to expect a response from the pressure upon the intelligence.

The people seem to know what our business *is*, but they really do not know what it ought to be.

One conception of our calling is, that we are tooth-pullers; another, that we are dental mechanics; some, with a stretch of charity, allow us to be artisans; a very few, after much argument, would consent, unwillingly, to rank us as artists; but I will assert, without fear of successful contradiction, that nobody considers ours as necessarily a learned profession. This assertion can be proved by an inexhaustible mass of evidence. There are individuals acknowledged to be worthy of this honor; but they are supposed to rise far superior to Dentistry. Our colleges are regarded as mere miniatures, and our literature they never heard of. Dentists are not allowed a professional fee. It is almost without exception considered to be an extortion, unless it bears some reasonable relation to the cost of the material used.

I was once called up in the night to treat a case of hemorrhage following the extraction of a tooth by another dentist. A drachm homeopathic bottle of tincture of nut-galls was given, with directions to use in case of recurrence. Months after, when a bill of two dollars was sent in, word was returned that it was too much to pay for so small a bottle of medicine. That is only a sample case.

Now I do not blame the people for all this. A celebrated theologian says that God has always given to every nation and people just that degree of liberty they were prepared to appreciate, and were willing to struggle for.

If Dentistry is worthy the liberty, the honor, the dignity, of a learned and liberal profession, we must ourselves first appreciate it, and live and die in the struggle to attain to it. But our practice will not rise higher than our conceptions. And we must confess that at present our highest conception of the mission of Dentistry is to scale off salivary calculus ; to dig out little holes and fill them up again ; to provide artificial substitutes, etc. Even for selfish considerations, for our own credit, let us believe in, and teach something higher, though the generation may pass away before it is to any considerable degree reduced to practice.

We are advancing. Tooth extraction, once constituting so large a part of every dentist's practice, is now with the more advanced class merely an incidental feature. Such progress has been made in repairing, that further success depends mainly upon the intelligent care given to the teeth by the patient. And are we willing to stop here, when the greater glory lies beyond ?

2d. We make it our business to repair the teeth. We have learned it too much as a trade, and will probably continue to do as others have done, because others have done it. So true is this, that in the case of our own children as well as our patients we do not conceive, appreciate, or apply any preventive treatment further than common cleanliness, and that is likely to be limited to the simple and often unheeded advice, "Brush your teeth." So slow is our development in this direction, that within the last half dozen years the declaration has been made by high authority that there were not three dentists in the city of New York who knew how to clean a set of teeth. And this statement finds some verification in the price list on cards now in circulation, ranging from $1.50 to $5. Another, and one of our teachers, says, "Use a good stiff brush, and change it often." I would say better wear it half out before using it at all. And this, I say, with all respect, in the light of personal experience, and observation, and practice, and under the low powers of the microscope, which shows the sharp, savage angles in the one case, and their absence in the other.

A most excellent dentist in successful practice for many years, when applying the cut-away plan, to his utter surprise found his boy's teeth generally decayed upon the proximate surfaces, and some of them fearfully near the pulps. Who has not been mortified by a similar oversight ? The mortification was the only thing to our credit. It portends better things.

Behold our vast array of instruments, apparatus, appliances, mate-

rials, all for repair. What for prevention? A few grains of phosphate of lime during gestation, and perhaps the occasional subsequent use of aqua calcis. Look over our books; search them carefully for their teaching of the golden rule of Prevention. Where do you find it? Echo answers, "where?" How many dentists have been long years in practice without ever having looked at a tooth with a magnifier? Some of our students are better acquainted with general anatomy than with the physical characteristics of the teeth. Only recently one of our patient plodders discovered by the use of ink the permeability of enamel through almost ever present fissures.

The reputation of the profession built upon repairing must necessarily be evanescent. It cannot well rise above a mere business.

At this point it would be appropriate, but I shall take it for granted that it is unnecessary, to detail cases to show how we do the one thing and neglect the other. Really, gentlemen, the thing neglected is the very thing which should be done first, and because it is not done first often results in failure and reproach. A mason would not use brick until they were baked, nor a carpenter, wood, until it was seasoned. The farmer would not sow his grain until the ground was prepared for it. But we are in hot haste to plant our golden gems in the very mud and odor and infection of disease, and without any evidence that we have not made a bad use of pearls.

Well do I remember when first commencing to operate upon teeth, a gentleman brought to me his grown-up daughter, with the declaration from both parties that Dr. So and So had filled her teeth and that the fillings had all come out. At a glance I was shocked no more at the uncleanliness than the injustice of the parties before me, and filled with alarm at the prospect of putting my reputation in such a place, (to draw it mildly) and such keeping. They were told that there must be some digging done before it could be determined whether the fillings were out or not, and that the patient had better go in search of them with the brush. I thus early learned not to blame a dentist, or encourage a patient to do so; and that our efforts would probably be successful only to the extent they were seconded by the intelligence of the patient; also, the importance of correct knowledge, thoroughly impressed upon the mind as well as the mouth.

3d. As I have intimated the extreme to which preventive measures are neglected, let us, for the advantages of a broad contrast, and to make sure of being understood, go to the other extreme.

It is susceptible of demonstration, that an intelligent, honest, faith-

ful dentist, can save more teeth by not spending any of his time in performing the usual operations, but rather by attending exclusively to preventive measures and teaching the same. Then he may properly be called a "doctor," which means to teach. Imagine ourselves throwing away our instruments, and accomplishing the same thing by almost entirely different means.

A brief statement of one or two cases will suffice to illustrate under this head. To commence at the worst and most unpromising extreme, we have before us an intelligent girl of fourteen sickly summers ; of full and fair proportions, thin skin, heavy, black hair, long, drooping eyelashes, and not a sound tooth in her head, except the inferior incisors. Now, what is to be done in this case ? The very idea of filling is absurd. Then the brush and lotions. For a year these were applied with all the skill of patient, mother, and maiden aunt. Still the results were very unsatisfactory. Extraction really seemed a necessity. So we commence with the roots of the left inferior first molar, with a troublesome alveolar abscess. Though suspecting hemorrhage, we could scarcely expect such a battle with bleeding as succeeds the operation.

Another year passes away. With some artificial incisors in place of those remnants, the young lady would really present a less hideous appearance. And so strongly is this urged, even by the family physician, who would send the patient, but would not come himself, that the four incisors were extracted under the effects of gas. There was unusually slight immediate hemorrhage. A styptic was applied, with hopes which were doomed to be disappointed in twelve hours. The battle rages for a week. It was the general opinion that no more teeth would be extracted for that young lady. Artificial incisors were put in place, and have been worn with comfort for four years.

Now what bearing has this case on preventive measures ? Simply this : that we were compelled to resort to other than what are called dental operations, in order to render the patient comfortable, or even endurable to herself and others. And what measures were adopted ? The most simple possible—the same as had at the first presentation been directed—such as any woman can practice. And perhaps when this simpler, but higher method, is generally adopted, woman will find room in the ranks of our profession not inappropriate to her abilities.

I used the brush daily myself, accompanied by an astringent lotion ; from time to time trimming off angles and projections, washing out and disinfecting the more hidden recesses, until there remained no irritating points or material ; the gums becoming healthy and hard, and mastication performed with comfort.

This case illustrates what may be done, even with a very bad set of teeth, by other means than filling. And further, and seriously, any intelligent dentist, having timely charge of this case, could have prevented all this protracted suffering and calamity, and the principal outlay would have been the cost of a tooth-brush. I remember more than twenty years ago a young lady school-teacher, with her teeth extremely decayed, was unable to have them filled. Pecuniary inability prevented her, and prevented me from bowing down to this, our great golden idol. I trimmed away the weakened walls, exposing to the eye and to external disturbance, the seat of devastation and ruin. Receiving, beyond this, only advice, by constant and careful attention she kept the *débris* and foreign matter removed, the cavities packed with charcoal or chalk, until they were thoroughly disinfected, the pulps undisturbed, and the mouth in a tolerably healthy and comfortable condition, though somewhat ragged. Of course filling, and an attempt at restoration of form, should follow.

Dr. T., by the administration of muriate of iron, destroyed the enamel upon the incisors of my little girl, which had just made their appearance. Now we all know that the usual course is for decomposition to continue, and to be allowed to continue, in such and similar cases, until a state of teeth and gums is presented, not unlike the example just discussed. By the semi-daily use of a suitable brush and chalk, the disintegrated, soft material, is removed, and though the dentine is exposed and discolored, presenting an unsightly appearance during the years which intervene to the time of the eruption of the permanent teeth, yet the surfaces are hard and smooth, and the gums unexceptionably healthy. The pulps, of course, are not disturbed, absorption of the roots takes place in due time, and the second denture is regular and perfect.

Other simple preventive measures also being taken, there is, at the present time, at thirteen and a half years of age, no appearance of proximate decay. Neither has there been what could properly be called decay in the fissures of the crowns, though the imperfections which would result in caries have been prevented from so doing by repairing with gold.

Your own experience verifies the statement that this is not an isolated or unusual case, but an example of a countless number, where the infant teeth have been thus early mutilated by the same or similar means. And I cite the success of sensible treatment in such, which are the most unpromising cases we meet with, as proof of what may be

accomplished as a rule, and the importance and duty of turning our attention more specially in this direction.

In one of our elemosynary institutions I examined the teeth of about two hundred boys and one hundred girls, ranging from eight to fourteen years of age. The unclean condition of these mouths was exhibited to the eye of the Superintendent, the physician, and other officials of the institution. They were desired to consider the effect of such a state of circumstances, and would it be permitted upon the fingers or the face. Urging also, that if it was necessary to keep the floors so clean, and the rooms disinfected, it was of still more importance, for the health of the children and all others who breathe in the same atmosphere, that these sources of such evidently impure air be disinfected.

Further, that these little fellows would feel happier, taller, nobler, better, because they were cleaner. I told them that simply by the use of the brush, they would do more to secure good teeth, than all the dentists in the city could do without it. I can assure you I started my project with the convictions and the will of all parties in its favor.

In due time, to give the necessary instructions, I appeared in the wash-room, with three hundred tooth brushes in my carpet bag, two large jars of prepared chalk having been sent in advance, and, arranging the children in squads on all sides of the large bath-tub, with little jets of water at proper distances, they soon learned to go through the most approved movements with military precision. The gentleman having charge of the boys entered into the plan with intelligence and zeal, and the daily brushing has never once been omitted for four years. The matron being so often changed, the plan as regarded the girls was a failure, with the exception of a few individual instances, where their own superior intelligence led them to retain their brush and continue its use. It is amusing to see how readily those few brushing girls may be picked out from the others by simply looking at their teeth. With the boys marching in a line before me, I have invariably been able to select any new boy who had not been furnished with a brush ; and in a few instances I have had boys stand aside for further examination, and afterwards learned that they had lost or broken their brush.

In no case do we find that dark or green appearance ; the teeth are invariably clean ; the gums hard and healthy, with the exception of a few very scrofulous cases ; proximate caries are rare, and general indications that in the crowns they make slow progress.

I am discussing the subject of "preserving the teeth," the wisest, most rational, most practical, most effective means of doing so. The

question of reaching the greatest number is an element in the discussion, of the greatest importance, not in a pecuniary, but in a humanitarian view.

Well, gentlemen say, we do tell our patients that they must brush their teeth, and that they must take care of the children's teeth. That is all well, so far as it goes. So I told those girls, yet but few of them do it. The boys do it because they have somebody to enforce the rule, until the habit is established, and they do not give it up when they leave the institution. Merely telling them to do so has but little effect except upon those happy dispositions where it is almost superfluous. Then it is necessary not only to discuss the measures for preserving the teeth, but the means of enforcing those measures.

Let us commence with circumstances as distant and different as possible from those involved in the first case, to which I called your attention : The infant teeth, just making their appearance in this dirty and wicked world. As we look upon their bright, sparkling faces, so pure in their loveliness, it is impossible for us to associate with them in our minds the idea of decay, destruction, death. As a thing of beauty, fresh from the hand of the great Artist, the all-wise and good Father, we are pleased, delighted. But as parents or nurses, we don't know how to take care of the little darlings. As physicians we do not ; so we give directions, if at all, to rub them with a rag. As dentists, we do not, we haven't an infant's tooth brush in the country. Well, we will have them, some time. The women will make them, when they get to be dentists. They would be too fine and soft for us, coarse fellows, to make or use.

These teeth need simply to be protected from acids, and kept clean, all parts, especially between them, by the use of brush, threads, tape, strips, picks. How often? A question so common, but so senseless. How often shall the face, hands, dishes, be washed? Keep them clean, is the answer; and look at them, to be sure they are so.

Just here is to be superadded medication when called for. Now, the children are brought to us too late, and we often dread to see them. But in the good time coming we will see the babies in time to bless them with the strictest and most dignified professional attentions ; we will instruct the nurses what to do, and show them how to do it ; and we will charge a professional fee which will have a tendency to secure compliance with our directions. When those to be expected imperfections in the crowns have to be repaired, they can be done without causing the least alarm, or leaving any doubt of success. Proximate

decay will be a thing almost unknown. If a thread was passed between the teeth even twice a week, commencing, of course, with their eruption, it would, upon reasonable calculations, diminish proximate decay one half. These surfaces need frequent inspection, and we will probably acknowledge they do not get it because of their inaccessibility. We can't get a view of them, even with a great deal of difficulty, and spending much time, for which time and trouble we know the patient is not willing to pay. Hence we knowingly wait until there is an excuse, and we are glad there is, for cutting them away. In the last volume of the Transactions of this Society, on page 63, as the language of the late lamented Dr. Wescott we find the following: "The separation of the teeth, preparatory to filling, is one of the most important operations known to the dental world." No one will deny that the separation of the teeth for the prevention or the extirpation of incipient decay, is of still greater importance. It would seem as if this difficulty might have been overcome if it had received the attention and the expenditure of ingenuity proportionate to its importance. Fillings in this locality are incomparably more difficult, and the only ones uncertain of success, for I hold that crown fillings need never be a failure. We need some device by which two crowns can be safely and surely parted from each other, and held there for inspection and manipulation. A young Samson capable of doing this would secure sweeter contents in the cavity than we read of in the story of old.

Such a device was born with this paper, subsequent to writing the above lines. It consists of a plate of steel bent upon itself, the two ends formed to fit the outer portions of the proximate surfaces of two adjoining crowns, and the plates to be forced apart by the action of a screw passing horizontally through the one against the other. This is applicable to all the bicuspids and molars. It does not touch the gums, or injure the teeth, or cause pain at the time sufficient to complain of, or leave any disagreeable feeling. It may be left on while operating, or a wooden wedge inserted to retain the space gained, and the appliance removed.

Another device consists of two wedges approaching or passing each other, and is applicable to all of the teeth. At your bidding it will hold any of them apart while you slip the rubber on.

If the teeth have, from their eruption, received the treatment already indicated, these surfaces will be found free from decay or discoloration. Otherwise they should, at the earliest opportunity, be treated according to the degree of development of disease.

Just in so far as we are held responsible, practically, as individuals, or theoretically, as a profession, for the preservation or health of the teeth, we should proclaim it our duty to inspect them at reasonable times, dating from their eruption, treat and direct their treatment as may be necessary, instruct, by practical lessons repeated and paid for *quantum sufficit,* until we secure the observance of our directions, which are our prescriptions. By thus doing, we expect, as a rule, to prevent irregularity arising from any except hereditary causes, and all decay, except slight imperfections in the crowns. The cost of time, suffering and money, will be far less than would be incurred by neglect, repair or loss. This service would be purely professional, requiring, like the physician's duties, comparatively little time, and for which a similar fee should be charged. This field, we know, has been comparatively unoccupied, perhaps waiting for the coming woman. If she does come, we have reason to believe she will lower neither the dignity nor the fee.

We must recognize and declare to patients and parents that it is a more important part of our duty to inspect and certify to the condition of proximate surfaces, than to fill teeth after they have been revealed to the patient by discoloration or breaking away.

There is nothing which so strongly savors of unselfishness, as the advocacy of this Gospel of Prevention.

Being true, is it not to become known? And who shall first proclaim ti?

It was not so long ago, but that a certain celebrated Divine is now living in the city of New York, who was once appointed on a committee to determine whether it was *right* to take any part of the Holy Sabbath to teach Bible lessons to children. That was a "new departure," a new Gospel, and the Divines were not the first or foremost to advocate it. How is it to-day? The feet of thousands of children are taught to tread the paths of virtue, with less expenditure of preaching, patience and pennies, than are wasted on one old sinner. The results of our labors may present a similar and as pleasing a contrast.

TOOTHACHE CURED BY ELECTRICITY.

Dr. Bouchard, of Paris, says that toothache may be almost instantly arrested by a constant battery current from ten cells. The positive pole is placed against the jaw, on a level with the painful tooth, and the negative pole to the antero-lateral region, on the same side of the neck.

OBSCURE DISEASES OF THE TEETH.

By A. HARTUNG, of Rudolstadt. (*Deutsche Vierteljwhrsschrift.*)

Translated by the Monthly Review of Dental Surgery.

The following cases of diseases of the teeth, which I have lately had the opportunity of observing, one after the other, offer, notwithstanding great differences in their appearance, nevertheless, this in common, namely, that all of them, in their commencement, could not be recognized as diseases of the teeth. They exhibited the outward form of other diseases, and thus showed, more or less, the great importance of the teeth in relation to the general organism.

1.—A gentleman of about fifty years of age, of a strong constitution, rejoiced in a splendid set of teeth. No tooth was wanting, and, according to his own belief, there was not a single carious one, a circumstance of which he often boasted to me, as he, a very busy surgeon, too often had the opportunity of becoming acquainted with the dental ailment of others.

Meeting me after a lapse of some time, he complained that for some time a rather severe pain in the neighborhood of the left outer corner of the eye, as well as a spasm of the left upper eyelid, had been very troublesome to him, hindered him in his work, and not seldom robbed him of his night's rest. All apparently rational means which were brought into use, were without results. Toothache, or any unusual appearance in the teeth, was not seen. As mentioned above, I found an excellent set of teeth; nevertheless, my suspicion that a diseased tooth was present was soon confirmed. Using a knee-shaped excavator as a sound, a carious cavity on the back wall of a left upper wisdom tooth was found, and by further pressure the sensitive exposed pulp. The patient, immediately confirming my suspicion that the pain proceeded from the tooth, demanded the immediate removal of the same. As was expected, the tooth having been extracted, the cause of suffering was removed. The pain and diseased appearances disappeared, and returned no more.

2.—A strong, thick-set man, fifty years of age, who had in general enjoyed good health, had suffered for several months from very severe headache, extending over the whole head. The treatment of several doctors had proved useless. That the suffering in its severity and extension could arise secondarily from the teeth, was naturally entertained. I recommended an examination of the teeth, found in the

second upper right carious molar the pulp exposed, treated the same with arsenic, and the suffering disappeared. The tooth was filled with amalgam.

3.—A girl fourteen years of age was brought to me on account of left upper canine being very much pressed forward. The next temporary tooth was still present, wedged in the space between the canine and the first small back tooth and small incisor. The removal of the temporary tooth, which I immediately wished, was not allowed ; it was expressly wished that all school work, confirmation, and so on, should first take place. So after several months, the extraction only took place, which, on account of the tooth being so wedged in, was rather difficult. The very long fang only absorbed on one side, was very pointed at the end. This case, not an uncommon one in itself, was of great interest, as on the removal of the tooth a rash, of the nature of Roseola, from which the child had suffered for several years, disappeared. It began generally on the left side of the face, was very unpleasant, and frequently confined her to her room. It never occurred again.

Whether this frequent illness was in consequence of the pressure of the above mentioned dental group, and the irritation from the sharp point of the fang of the temporary tooth, or was in connection with the period of life of the patient, I should not like to speak with absolute certainty, though I am not inclined to the latter supposition, as the whole appearance of the girl was childish, and parulis had never occurred. The relations of the patient considered the former disease entirely due to the abnormality of the teeth, and they had so much more right, as otherwise, no other present change in the health of the patient could be connected with it.

4.—A lady, twenty-eight years of age, with a small, thin face, who had never been really ill, except with childish diseases, with whom I became acquainted five years ago, shortly after her marriage, when she came to me for advice, then, for the first time in her life, on account of her teeth, had very large, uncommonly white teeth. The upper incisor stood out very much, notwithstanding that it had been, several years before, very much shortened with the file, in order to improve the appearance of the face. Much care had been bestowed upon her teeth, as several gold fillings showed. Some of such fillings had been lost, others had carious furrows at their edges.

The general characteristics of the lady should here be noticed, namely, that she belonged to those intellectually gifted natures, whose nerves and intellect preponderate. The first examination of the teeth, and the

result that was gained with the former well carried out gold stopping, augured unfavorably in the future for the preservation of the teeth. This was fully confirmed, as, notwithstanding the utmost care, the back teeth were lost very rapidly, especially after too quickly following confinements. At a later consultation, my patient remarked at once that she could not have much done to her teeth this time, as she was undergoing a thorough course of medicine, on account of an intermittent fever which she had caught on her last journey, and which was connected with neuralgia of the face, every attempt to diminish the suffering from which, was without success. I had not seen her then for nine months, and again lost sight of her for about the same time. A short time ago she came one day with her husband. To my first question, what course her illness had taken, and how she was then feeling, she replied, with a happy face, that she was quite well, and that it would be especially interesting to me to learn that the sole cause of all her suffering had been a diseased tooth.

The following was then related to me. The facial neuralgia had always occurred in a curved line, from the right outer corner of the eye, to about the middle of the forehead, and had never left this line. The pain soon only took place at certain times, and was first accompanied with shudderings, followed by heat, and finally with strong general perspirations. The attacks begun at 6 o'clock in the evening, and ended only at 2 o'clock in the morning. The illness was, as was only natural, considered intermittent, and the more so as enlargement of the spleen was found. A course of treatment was now undergone, and a favorable result expected, as here we possess a specific which seldom leaves us in the lurch. The use of quinine began ; this, however, soon seemed useless, in whatever doses or variety. Change of doctors, of course, occurred. The patient went from one celebrity to another ; always intermittent fever with the usual symptoms of pain, sleeplessness, and so on, treated as one would imagine, with quinine, also with embrocations, subcutaneous injections, morphia, chloral, etc., but in vain. The patient was ordered sea bathing, which, however, soon seemed to make the suffering greater. The pain increased so much, that the patient, in desperation, thought of suicide. At the worst, quinine every now and then gave relief. A new physician was called in. All other remedies having failed, Bad Schmalbach was recommended, when all at once the teeth were thought of. The patient went to a dentist, and had, on the side she was suffering so much pain on, the worst tooth drawn. Here and there, latterly, she had felt a slight drawing in the

neighborhood of the lower part of the cheek, and a slight swelling of the sub-maxillary gland on this side, pointed also to this tooth, the second lower molar. The following night the patient slept quietly for the first time. It seemed as if the whole of this dreadful illness had disappeared. I could learn nothing nearer about the condition of the tooth. Let it be noticed that, during the whole period of suffering, which lasted a year and a half, all other functions remained undisturbed.

Amongst the symptoms associated with intermittent fever, toothache often occurs. In such cases toothache brings only one of the symptoms associated with the fever. When the cause, that is the fever, disappears, the toothache no longer remains. In our case, however, the toothache was the cause, and the intensity of the symptoms producing fever in which the whole body sympathized, must be put down to the great nervousness of the patient. That great disturbances in other functions of the body did not take place during the long continuance of the disease, for example, in the digestive and nutritive organs, as would have done in real intermittent fever, shows plainly that the neuralgia and appearance of fever were merely symptoms. With regard to the swelling of the spleen, I think that those most accustomed to make a diagnosis may sometimes err.

In relating these four cases, I wish principally to show that the attention of doctors should be directed more to the importance of the teeth. Very often, to the great injury of the poor patient, the attention to the teeth is very slight, even preventing the patient having his teeth attended to.

ANNUAL ADDRESS DELIVERED BEFORE THE AMERICAN ACADEMY OF DENTAL SCIENCE,

At its Seventh Annual Meeting, held in Boston, Sept. 28th, 1874, by DR. W. W. ALLPORT, *of Chicago, and published by unanimous vote of the Academy.*

Mr. President and Fellows of the American Academy of Dental Science :

In an annual address, on an occasion like this, it would seem that remarks bearing upon the interests of our profession at large, rather than upon any particular question of practice, or science, would be appropriate.

The oft-recurring meetings of members of our profession, in different parts of our own country, as well as in Europe, at which papers are presented, evincing close observation and careful study upon modes of

practice in the different departments of dental science; the multiplication of our text books and the well filled pages of our periodical literature; our dental colleges, with many of their chairs filled with teachers qualified to instruct in medical colleges, as well as the high professional and scientific character maintained by many private practitioners, are, I think, sufficient evidence that there is not only an earnest desire, but a *determination* on the part of the better members of our profession for advancement and a correct application of dental science.

That within the last thirty or forty years rapid and substantial progress has been made in this direction, has been fully demonstrated in the experience of some of the older members of this Academy, as well as by those of like age and experience throughout our country.

But, because so much has been accomplished within this time, or during the present century, let us not be boastful; for, when we consider the changes and improvements that have been made in the science and practice of medicine, both general and special, in husbandry, in the arts, and in the sciences in general, there is not a little reason to question whether we, in our particular calling, have more than kept pace with the progress and developments in the other fields of science and labor around us.

Dentistry as a special art or department of science is, it is often said, mainly, at least, of modern origin. It is an outgrowth, partly, of an increased ratio of disease in the teeth, though not so much, probably, as it is of a new demand of the advanced civilization and culture of the age. At an early day—far back in the past—when education and refinement were less general, teeth, undoubtedly, suffered decay and gave trouble, but less being known of the causes of disease and less of correct treatment, and less attention being paid to personal appearance, less importance was attached to the teeth than at the present time. But, as civilization advanced and culture and refinement increased, health rose in estimation, cleanliness and personal appearance received more attention, and, as a consequence, defective and unsightly teeth became objects of greater concern, and dentistry, at first rude, came up and has grown to its present magnitude and perfection, to meet this new demand of the times, just as the printing press, the telegraph and steam locomotion were first brought into existence, with all their imperfections, and have, by ingenuity and skill, from time to time, been improved to meet the demand created by the growth of business and desire for progress and information incident to the increase of population in our country and the spread of the civilization of the century.

When, therefore, we are persuaded to think that the improvements in dentistry have been greater, or that they have been made more rapidly than has been the general progress of the age, it will be well to remember that teeth were filled when the printing press was but in its infancy, and that steamboats and railroads and telegraphs came into use long after artificial teeth were worn by George Washington, the first President of this, then experimental, Republic. Then, days and nights of most uncomfortable and weary travel were consumed in an overland journey from New York to Boston. Now, we sup and attend evening amusements in New York; then in flying palaces of rare woods and costly upholstery we retire to beds of luxury; and in the morning, with carefully made toilets, and with a *resumé* of the news of the world, as a relish, we breakfast in Boston. Then, to have transported by land the amount of freight that is now carried from Boston to New York in a single train of cars, in a few hours, would have upset the labor and taxed the resources of all New England for months. Then, to have journeyed from Boston to where the city of Detroit now stands, would have been to bid farewell to friends and to place one's self beyond religious instruction or the watchful attentions of New England sheriffs. To-day, Chicago and even the Rocky Mountains, are but convenient places for replenishing the lunch baskets or larder, of the thousands who, every year, over mountains, through valleys and beside rivers, in Pullman's winged hotels, go rushing across a continent, composedly viewing prairie and lake, forest, fretting brooks, sierra and canyon, and the silvered course of great rivers, and taking in, now and then, a glimpse of a herd of wild buffalo, or camp and dance of wild aborigines. Hamlets and cities, the growth of a few months, are left behind in rapid succession, as on and on they rush to or from the golden State, the Atlantic or the Pacific coast.

Could the wisest statesman, who lived at the commencement of the present century, be set down to-day in that great city of the West, once burned and twice built within the last forty years, and witness the passengers and freight passing East and West over the great trunk roads centering there, he would surely think that this was not the world in which he once lived, and that the inhabitants of this strange land were changing ends with the continent, so altered and improved have all things become, so different the bulk and modes of travel and business.

Take whatever example we please, be it in agriculture, the arts or sciences, education, civil or religious freedom, the arts of war or those for promoting intercourse and preserving peace and thrift, the progress of

the last seventy-five years has been greater than that of centuries before.

And only abreast with the advance of the age, have marched the improvements in the science and practice of dentistry, the surgical or operative department of which, when rightly understood and practiced, has become a legitimate branch of medicine, requiring the same general knowledge of medical science, as does the practice of aural or general surgery, or ophthalmology.

The same general laws of health and disease pervade alike the most vital and the most remote and unimportant organs of the human body. To comprehend the laws that govern either the physiological or pathological condition of any particular organ or member of the body, how to preserve health, or intelligently treat any particular disease, be it either general or special, requires such a broad and special knowledge of the laws of health, and the nature and treatment of disease, as would qualify the special practitioner to diagnose and acceptably treat the ordinary forms of disease met with by the family physician. Special knowledge of any particular form of disease, and unusual skill in its treatment, requires a general knowledge of the laws of formation, of growth, of the nature and results of different diseases, and of the treatment compatible with nature, that is best calculated to restore diseased parts to healthy action and conditions. Treatment upon the human organism, either general or special, resting upon any other foundation than this, is simply empirical.

We have heard much these many years about dentistry being a specialty in medicine, and about its claim to be so accredited by medical men; but if the above views are correct, to what extent should dentistry, as it is generally practiced at the present day, be so regarded? And to what extent should dentists, as a class, rank with surgeons, ophthalmologists, or aurists, as legitimate specialists in medical practice?

In inquiring into this question, it will be proper to allude briefly to the past history, and the present condition and needs of the profession.

While history informs us that, as early as the days of Herodotus, dentistry was practiced, it is safe to say that, until a comparatively recent date, dental work of any kind was exceedingly rare, and the business was not followed as a distinct calling. The little that was done was confined mainly to the carving and setting of artificial teeth from wood, bone and ivory, possessing but little artistic taste or use. I make no new statement when I say that up to about the beginning of the present century, teeth were extracted by barbers and surgeons, and that artificial teeth were carved and set by jewelers and silversmiths only. Although

teeth were then occasionally filled, the construction of a set of artificial teeth was regarded as the *ne plus ultra* of dental skill. At the same time this was looked upon simply as evidence of that peculiar mechanical ingenuity which enabled the artisan to turn his hand to any odd job outside of the regular routine of his trade. Dentistry was then merely mechanical; comparatively nothing being known, either of dental histology, physiology, pathology or therapeutics.

Experience having demonstrated that fillings, though imperfect, would arrest decay in teeth, the demand for these operations increased; but up to this time they seemed to be empirical, the science of their beneficial effects not being understood. But as the period of the higher mission of dentistry—the saving of natural teeth—approached, Hunter, Blake, Fox and other medical men began to study more closely their structure, their physiological and pathological conditions, and their relations to the general system. Then followed the therapeutics of filling, and the science becoming better understood, a demand for better and more frequent operations upon the natural teeth arose, and for the purpose of making artificial teeth and the treatment of natural ones, a copartnership between medical science and a mechanical art was entered into and conducted under the firm name of "Dentistry."

Under this new condition of things, Dentistry began to have a literature, and its practice was espoused by men of higher culture, to whom it offered a field for the exercise of more varied talents as well as one of greater usefulness. In a few years such men as Greenwood, Hudson, Hayden, Parmly, Flagg, Harris, Townsend, Clute, Westcott and Badger were found engaged in practice. The science and practice of Dentistry, in its various departments, were pushed forward with great rapidity, and schools were formed, in which was given such medical and mechanical instruction as was thought necessary to qualify the student for practice in accordance with the standard sought to be established by such men as I have named, and with a view to making it a specialty in medicine.

Dentistry, thus given over to a special class of practitioners, has conquered its way, by its inherent importance to the welfare of man, up to the high position—taking its ablest representatives for the criterion—it now occupies, and in this growth, it has approached nearer and nearer to its normal status and true mission, an integral part of the science and art of medicine.

In bringing about this result, whereby our practice has been settled upon a more scientific and practical basis, and a wider range and

better class of operations brought into vogue, our dental colleges have been greatly instrumental. The complaint, however, is frequently made, and not altogether without grounds, that the standard actual, for graduation, in these colleges, is much below their standard as formulated ; and that diplomas have, in many instances, been conferred upon persons unworthy to receive them. Still I feel that it would be unjust to say that the actual standard has not been fully up to the demand, either of the profession or the public. In fact, I believe our schools have been more anxious to graduate first-class practitioners than a large majority of the public have been willing to encourage and pay for first-class skill.

I am aware that it is said the demand of the age is for better dentists and better dentistry. I do not deny that there is *need* of a better class of dentists, but, at the same time, I believe that the average skill of the graduates of our colleges is really up to the demand of the general public. Let it not be inferred, by these remarks, that I wish, or intend to sanction, or apologize, for the shortcomings of our colleges, in graduating those whom they know to be unfitted for practice and unworthy of the honor conferred upon them. I merely state what I regard to be a fact ; they supply, not the *need*, but the actual demand of the public, in the productions which they send forth. The principle is not unlike the inexorable laws of supply and demand in trade. The people usually get what they appreciate and demand, whether it be in commerce, manufacture, education or professional services. Let those, therefore, who desire to see our schools more exacting, as to the qualifications of their graduates, see to it, that, not only by a correct example in practice on their own part, but also by a systematic and correct course of popular dental instruction, in public prints, journals and otherwise, the people are taught the importance of saving their natural teeth, and the difference between correct practice and quackery. Then, too, it will be well, for some of those who find so much fault with our dental colleges, to take care that there be such an elimination of students, that those only, who have a sufficient amount of brains, and other requisite qualifications, to make good practitioners, be encouraged to enter the practice, and that such private instruction be imparted to them as shall qualify them to receive the greatest benefit from a high grade of teaching in our colleges, or else cease their fault-finding.

I do not wish to exonerate our schools from the just blame that should be attached to them ; but, let it be remembered, that the

sin of omission, on the part of the profession, is quite as great as the sin of commission, on the part of our colleges. Let him that is without sin cast the first stone.

While no one can question that amongst the educated and better classes of people, there is an increasing demand for higher skill in saving the natural teeth, no careful observer can have failed to notice the fact, that, within the last fifteen years, there has been an increasing demand for cheap sets of artificial teeth. The result of this is, that the better class of men entering the profession are devoting their time, almost exclusively, to operative dentistry, in the service of patients who really appreciate skill ; while the inferior men are turning their attention to low-priced mechanical Dentistry, and to inferior operations in filling teeth for such people as neither appreciate, nor are willing to pay for saving operations on the natural teeth.

That mechanical Dentistry should have very largely fallen into the hands of this inferior class of practitioners will hardly be wondered at by those who have watched the history of that branch of the practice. Up to about twenty years ago the mechanical department of the practice required a practical knowledge of selecting and compounding the materials out of which the teeth were made ; the hand and the eye of an artist were requisite to give them form and color ; the management of heat in baking them ; a knowledge of the nature of the precious metals and skill in working them, and a high order of mechanical talents in applying intricate mechanical laws in fitting and rendering useful the different forms of plates, together with mechanical and artistic skill in so adjusting the substitutes as to subserve the purposes for which they were intended. Since then, the manufacture of artificial teeth has become a distinct business, and they are now simply articles of commerce, bought by the piece, set, or thousand ; and to such perfection has this branch of manufactures been carried, that few dentists now think of making the teeth they use. Plates of precious metal, requiring mechanical skill of a high order to manipulate, have, in a large majority of cases, been substituted by plates cast from baser metals, or by rubber vulcanized in molds, these requiring neither a high degree of judgment nor mechanical skill to accomplish results tolerably well, limited by the properties of the material used.

As a consequence, therefore, of these conditions, the surgical branch of Dentistry, which, when practiced by competent men, allies it to medical science, has been constantly on the advance, while that which is devoted to the setting of artificial teeth, has, in the last few years,

been steadily retrograding and becoming more and more a trade. And so simple are the modes of attaining tolerable mechanical results, with the methods now usually employed in this department, that a high order of appropriate talent is, at the present time, seldom found devoting much time to it. By this I would not be understood as saying that this latter department does not need improving, for, when viewed as an art, he who has but moderate ideas of symmetry or harmony of expression and color is constantly pained by the lack of that artistic selection and arrangement of artificial teeth, which serves to restore to the face the shape and expression left upon it by the Creator—the absence of which, in artificial dentures, stamps him who should be an artist, an *artisan*—a mere mechanic—a libeler of the soul—a deformer of the human face, divine.

At the present time there are about 12,000 practicing dentists in the United States, about 2,000 of whom are regular, or honorary graduates of either dental or medical schools. To offset the unworthy graduates by those practitioners, not graduates, who, by study and exertion have earned a deserved reputation and position in practice, would, I think, form a fair estimate of the really competent practitioners of scientific Dentistry in the United States at the presenr day; making the number of the really qualified about one-sixth of the entire number. Assuming, therefore, that the one-sixth, as are the members of your Academy, sufficiently advanced in the knowledge of medical science to entitle them to the right to be regarded as special practitioners of medicine, it can hardly be expected that Dentistry, as a profession, when taken as a whole, would, or ought to be so regarded by medical men.

This claim, while being justly made by some, and freely acknowledged as to a portion of dental practitioners, individually, has, not without cause, I think, been denied to the profession at large. The tastes, habits and acquirements of the two classes of dental practitioners are as divergent as are the characters of true science and mechanism; the practice of the one being established upon a medical basis, while the other relates only to a mechanical art. The practice of either branch, it is true, involves a limited knowledge of the other, but it is not necessary either for the surgical practitioner to be a practical mechanic, or the mechanician upon artificial work, to understand the rationale of medical treatment, or to be an operator. In fact, the practice of both, by the same individual, prevents the highest development of either, as would the time spent in the manufacture of artificial legs by the surgeon, or the compounding, baking and coloring of artificial eyes by the oph-

thalmologist, serve but to retard the higher development of their specialties, or an attempt by the maker of limbs, eyes, or optical instruments to practice general surgery, or the treatment of the eye, but degrade his own proper art.

As I have before stated, the yoking together of the two callings seemed to be a necessity of the condition of the practice at the time they were joined, and has resulted in great good. But the development of the practice has now brought us to a point where it is clear a new departure should be taken, the copartnership dissolved, and each department followed as a distinct and separate calling. Neither in private offices, nor in our colleges, should the two be taught as *one*, nor should the term "dentist" be retained in our nomenclature.

The true mission of medical science is to preserve or restore health and save life and limb, not to make or have to do with the making of artificial substitutes any further than as they shall be made directly useful in subserving these purposes. Wig-making, and the manufacture of artificial limbs and eyes, are useful and respectable callings, and, when properly pursued, require a good degree not only of mechanical skill, but also of artistic taste ; and as well almost might the making of these be taught in the medical college as the making of sets of artificial teeth form part of the curriculum in a medical specialty. The long association of operative with mechanical Dentistry, will make it somewhat more difficult, at first, to disconnect them in the minds of the public, than in practice, as separate callings ; but no professional act would be so directly instrumental in accomplishing this result, as to drop mechanical Dentistry from the curriculum of our colleges, and save the time usually devoted to the teaching and practical work in the manufacturing and mounting of artificial teeth, and to other laboratory work, and employ it in giving broader and more comprehensive instruction in the science of medicine in these schools, or else, to incorporate them with the regular colleges of medicine, by the establishment of appropriate chairs and infirmaries for clinical teaching.

Let dental mechanics be otherwise taught, as a high mechanical art, and the calling fixed in the mind of the public as such, and, in a few years, a patient would as soon go to the maker of artificial legs for advice or treatment, in conservative surgery, or regarding amputation, as to the *dentician*, or *dentificier*, for advice or services in the saving of his natural teeth, or their extraction

To drop the teaching of mechanical Dentistry in private offices and in our colleges would, in a few years, permanently divide the practice,

and very soon each town of any considerable size, would have one of more of these practitioners who, by relying entirely upon success in this calling for support, and becoming personally responsible for what they did, would seek to redeem and elevate this particular art to the highest degree attainable, thereby enhancing the respectability and usefulness of their calling. And the *dentologist* would, by the broad and comprehensive teachings of medicine, become more thoroughly grounded in its science, and be better qualified to take his rank with the other medically recognized specialists. With this thorough ground-work laid, he would not only be better prepared to treat from a medical stand-point the diseases belonging to his province, but also to grapple successfully, by general treatment, with those hidden and hitherto ill understood influences which serve to prevent perfect dental development, and also to counteract those pathological conditions which act as causes of disease in the teeth, and tend to break down their tissues.

With the development of this higher mission of our profession there will be no occasion for the spectacle of dentology, with the grimace and shuffle of the mendicant approaching the gates of the medical profession, and with downcast eyes begging a crumb of recognition. But with the accomplished separation of the two callings, heretofore combined in our practice, dentology, enriched by the experience and the special literature of the last half century, and the foundation of its practice laid exclusively in the science of medicine, rather than divided between that and a trade, the incongruity of the past will, in a few years, disappear. By deriving its nourishment from the body of which it is a branch, it will become more and still more assimilated to the science and the practice of medicine, and without demand, or the asking, there will, both by the public and the medical faculty, be accorded, not to individual practitioners, but to the branch, a full and cordial recognition as a specialty in medicine, which will attract more generally to its ranks, as to an agreeable and useful field of labor, men of earnestness, ability and culture, the peers of any in an honorable profession.

The immersion of hides for hours in a two per cent. solution of carbolic acid, and then simply drying them, has been recently substituted for the tedious and expensive process of salting them for transportation from South America and Australia, and with most satisfactory results. Bones have been similarly treated for transportation.

CONSTITUTIONAL EFFECT OF CARIOUS TEETH.

By W. Irving Thayer, D.D.S., Brooklyn, N. Y.

The following remarkable case was related to me by a thoroughly educated physician, a graduate of a French School of Medicine, and a gentleman in whom I have the utmost confidence.

"A lady, Mrs. Mexican, about thirty-six years of age, of a bilious nervous temperament, had suffered from six to seven years from debility and great nervous prostration. She was anæmic, and had been confined to her bed most of the time for the past three or four years. This was previous to July, 1862, the date of my first visit to the patient. Found her suffering from the malposition of a portion of the root of the left inferior dens sapientiæ, which was partly imbedded in the alveolar process, and laying somewhat transverse in the soft tissues, with tumefaction of the soft parts. I removed the root with the lancet, and a moderate elevating force. The character of the pains were, and had been those attending peridental inflammation, which had induced extreme nervous prostration. For six or seven years she had not been able to characterize any local pains, save those from the buccal cavity, and had in the meantime been treated by all the physicians in the town, some eight or nine, who had utterly failed in every instance to afford her any relief, or up to this time to diagnose her case properly. The principal characteristics of her condition at this time, as we have before intimated, was debility, and indisposition to do anything, and confinement to her bed. She had been treated upon the most approved plan of depletion, and catharsis, following the antiphilogistic regimen to the letter. Then by tonics, (so called), till she and her friends had given up in disgust and despair of ever regaining her former good health. Among those who had treated her was an eminent French surgeon, whose prescription I saw, which was composed of *forty different remedies*, by actual count. Certainly enough to satisfy the avarice of the pharmaceutist and the therapeutic skill of the prescribing physician, if not to kill the patient; yet, all without avail. An examination of her mouth induced by her complaining of the soreness of the parts, revealed the above mentioned difficulty. Upon consulting the different gentlemen who had given her previous treatment, they all frankly acknowledged that up to this time (July, 1862,) they had not been able to diag-

nose her case. In an hour after the removal of this constitutional irritant, the patient recovered considerably from her former extreme nervous prostration.

She was first seen on Sunday afternoon, at which time the root was removed, and a few drops of *arnica* was given in one-half tumblerful of water, a teaspoonful once an hour. The second visit was on the following Thursday, when the patient was found sitting up, surrounded by a large number of her friends and neighbors who had gathered there to witness this marked improvement, and who imagined that this change in the patient indicated that her end was near.

She was looking bright and cheerful, and they (the friends) were waiting, momentarily expecting that she would take her flight from all sublunary things. When apprised of the erroneous views of these spectators of this pleasant scene, I advised them to gracefully retire, and permit the patient to get well, which she did, without let or hindrance, and without further surgical or constitutional treatment.

The patient fully recovered her health with the aid of the pabulum furnished by a good diet, and was well and happy as late as the fall of 1866, and had continued so during the interim—over four years after the removal of said fang."

The physician relating this to me, states that both he and all the other physicians who attended her, *finally fully agreed*, that all her constitutional troubles were caused by the different stages of inflammation, of the periosteum and soft parts, caused by this erratic dens sapientiæ, whose carious condition had been traced to a time anterior to her confinement. I will add that I have known of some of my own patients cured of migraines and other form of headaches, amaurosis, strabismus, and long continued hysteria, that was not dependent, or even attributable to reflex uterine irritation, simply by the removal of one or more carious teeth.

It would seem that this remarkable case might have had a different cause than the one assigned to it ; but I am assured that there was no other cause discovered, though sought for very carefully.

A lunatic from the Hartford, Conn., retreat, who was taken out to have a tooth drawn, liked the operation so well that he insisted upon having the rest of his teeth extracted, and it took half a dozen policemen to get him back to the asylum.

ESSENTIALS OF TRUE SUCCESS IN DENTISTRY.

A Paper read before the American Dental Convention at Saratoga, in its Annual Meeting of 1874, by
PROF. B. F. COY, D.D.S.

MR. PRESIDENT AND GENTLEMEN OF THE AMERICAN DENTAL CONVENTION :

It is with feelings of intense pleasure that I again meet my brethren of the profession, earnestly endeavoring, both collectively and individually, to do all in their power to push forward the best interests of our chosen pursuit, and when I look around me and see the number of distinguished members who have labored so faithfully in this cause for so many long and weary years, I am not surprised at the rapid progress which Dentistry has made up to this time, and I feel assured that its present stand-point is but the dim foreshadowing of the brilliant realization of its future. I say when I look around me and see these patient and careful laborers, who have given so much of their valuable time to speed Dentistry onward to its legitimate position among the specialties of General Medicine, and feel how much has been accomplished, I cannot doubt but that, in not a very remote future, the acme of our wishes and hopes in this respect will be fully attained.

I have been in practice for more than a quarter of a century, and in reverting to the past, and bringing up in review the paraphernalia of our offices and laboratories, and the surroundings and difficulties which have beset our paths, and the gradua, but certain changes which from year to year have been developed, I feel amazed, and only wonder how, in "days past long ago," we managed as well as we did, or were ever blessed with a single success.

General Surgery, which is now held to be the highest success of all the medical specialties, and one which gives the most honorable name to a skillful and scientific operator, started where Dental Surgery did, in the hands of barbers and blacksmiths; but its march was onward, because it was scientific, and because it cut loose from all dogmas and theories, and held only to demonstrable and scientific truths, and in the race for certainty and efficiency of effect, it soon outstripped them all. Let Dentistry pursue the same advantages, clinging only to known truths and proven facts, and who can name the round of the ladder that will stop her honorable and ambitious climbing. Let us all continue our good work, and while we assume nothing to ourselves, may we not reasonably hope that general medicine will one day or other recognize in our profession her own offspring, and willingly take her own child by

the hand, and be only too glad to give credit where credit is due; such will certainly be the case if we are true to ourselves and do our whole duty; if we fail in this hope, the fault will be our own. General Surgery had the same obscurity of birth, and consequently the same difficulties to overcome, and the same prejudices to set aside. She has succeeded and is perched on the topmost round. Let us therefore be patient, and without arrogating too much to ourselves, labor to deserve.

But I am digressing, and not desiring to waste a moment of your valuable time, I shall proceed at once to the discussion of my subject, "The essentials of true success in Dentistry." In considering this question we will naturally first ask "What is true success?" Our second query will be, "Who, on entering the profession, can reasonably hope to attain success?" We will then consider, "What is the best means of preparation that will lead to success?" And lastly we will inquire, "How shall a practitioner conduct himself to realize such an end?" It has been said that the highest success a medical man can attain, is to give something to suffering humanity which is valuable; and the more valuable the gift, the higher the success attained. If this is so in general medicine, the same rule holds good in our profession of Dentistry.

Harvey, who discovered the circulation of the blood, Jenner, who discovered vaccine, and Wells, a dentist, who discovered the peculiar qualities of ether, and thereby gave to the world its first anæsthetic, have left reputations which will never die, and have immortalized themselves; and this same principle of success applies to all the votaries of science, whether considered in the past or future. Gallileo, who discovered that the earth revolved around the sun, and Newton, who discovered the laws of gravity, will never be forgotten, and their imperishable names will always be handed down to posterity with the greatest pride, and mentioned with the most profound respect, admiration, and feeling of gratitude. But other men, although not so distinguished as those just mentioned, in different scientific pursuits, have, I consider, attained also, true success; so that, while we acknowledge that brilliant and useful discoveries give most reputation, or the highest attainable point of success, we still think that other considerations and qualifications give success too, and they differ only as "one star differs from another in glory." He who, however, has lived the life of a drone, and wasted his talents, and given nothing to the human family, either in point of time, attention, discovery, teaching, application or observation, has deliberately cast aside all that is divine, and placed himself on

the platform with brutes; on the other hand, he that has given his time, attention, and the results of his application and observation, is doing all that he can to benefit humanity, and consequently deserves his reward; if he has discovered nothing brilliant in his life of usefulness to give and transmit to posterity, it has not been his fault, and often these bright and startling discoveries are the results of mere fortuity. To sum up, therefore, I should say that he who has been, or is devoting his life to the furtherance of his profession, regardless of all selfish considerations, is unquestionably in the "straight and narrow road" that leads to "true success."

The discoverer who makes and leaves a brilliant reputation, and thereby gains the highest point of success, often, I might say generally, acts as mere pioneer in the onward march of science, and by his transcendent genius works out some grand new truth, gives it to humanity, and then stops his career of usefulness, or betakes himself to some other field, hoping to discover some other new principle, new truth, new phenomenon, or new fact; following, however, in the wake of these brilliant pioneers is an army of honest workers, who seize upon the new discovery to utilize it; to give to the world all the benefits which can be wrought, tortured, persuaded or forced from it. They devote it to this—to that purpose, to any purpose, to all purposes which can be made beneficial to mankind. I think you will agree with me that the one class is as necessary to the welfare of increasing and growing enlightenment and intelligence as the other; and who would detract from the one or the other? "The laborer is worthy of his hire." To the genius of discovery we vote the highest honors, and next comes he who utilizes the new born fact; who extracts from it all that is useful, and nurses it and develops it to the greatest good. In our profession there are many avenues or streamlets of Art and Science, which empty into a common channel and there become so thoroughly mingled, that to disintegrate and separate them is impossible, and this constitutes Dentistry, which I would liken, as a whole, to some grand central reception depot, where everything that is valuable or useful to the profession can be collected, piled up or stored away for future wants. The first-class operator, who, by years of patient manipulation has swelled his stream to its fullest extent, pours into this depot of common property all that he has gathered. The mechanical dentist, who has devoted all his time and talents to his branch, swells his stream of knowledge but to empty it into the same reservoir. The teacher of dentistry is faithfully pursuing his career of usefulness, and is as necessary to the general ac-

cumulation as is the brilliant operator. He who is elaborating useful truths through the different medical branches, which give to the Art of Dentistry all that it can claim of Science, is as essential to the profession as the most successful mechanical workman ; each is performing his respective part, and I claim that he who is working honestly, and without selfish considerations, for the good of the whole, no matter what branch or avenue he is pursuing, is on the road to success ; and just so soon as he is sufficiently well informed and practiced to take a leading position in his special work, he is entitled to the full credit of having attained "true success." It is simply impossible for any one man to attain true success in all that pertains to Dentistry. Human life is too short to accomplish so much ; he must therefore choose one sphere of action, a single one of its branches, and if he can develop that to its highest point he has done well. We will require no more of him, and will take delight in honoring him.

The second division of my subject is, I think, a most important one. "Who, on entering the profession, can reasonably hope to attain success?" In answer to this question, I think, upon general principles, I may safely state that honesty, intelligence, application and adaptability, are the important qualifications which are required, and upon which a reasonable hope for success may rest ; but he who is about entering the profession must choose his sphere and avenue to work in, and he must be specially adapted to that particular branch which he has selected, and he must also have the necessary bodily health to enable him to pursue his labors without sinking under them. If Operative Dentistry is to be his specialty, I will warn him here that he must possess a natural manipulative ability ; he must have a hand that can be trained to the most delicate touch and use of instruments, and an eye equally accurate to guide him in his operations ; I consider this absolutely essential to him who aspires to become a first-class operator. If a man has a hand like the flap of a turtle, and as totally unteachable, I defy the world in all its efforts to make him an operator ; he has mistaken his calling and will *never* succeed. Theory is powerless under such circumstances : he must not only have the brain to conceive and the eye to direct, *but the hand to execute.* How often do we meet with sisters who have had precisely the same advantages in learning the use of the needle ; the one will execute the most elaborate and beautiful specimens of her handicraft, while the other, lacking adaptability to this purpose, fails absolutely ; no amount of teaching or practice will enable her to contend successfully with her more fortunate sister. I have often thought that

the peculiar qualifications which enable a man to become a first-class surgeon, are also requisite to a first-class dental operator; they both require the same manipulative ability in order to be successful, and they both require the same accuracy of eye to guide them, and I believe that all great surgeons and all good dental operators are more or less natural mechanics. Surgery of all kinds is a mechanical operation, and without the brain to conceive, the eye to direct, and the hand to execute, success is impossible. We have all of us met with dental practitioners whom no amount of experience or practice seems to improve in their operative ability, and they work on and labor hard to no purpose; in the start they lacked adaptability to their special undertaking, and their whole life is wasted in accumulating nothing; so in mechanical dentistry, a man must be adapted to his pursuit, or failure will invariably follow; and the same rule will apply to all the other branches of the profession. "You cannot make a silk purse out of a sow's ear." If he is to be a teacher, he must be adapted to his calling, and must have the power to impart knowledge. If he desires to write for the benefit of his profession, and in that way assist to elevate its standard and increase its usefulness, he must think well, digest thoroughly and write forcibly, or his writings will have no effect and his time will have been wasted. If he desires to push forward the collateral branches of Dentistry, such as Anatomy, Physiology, Chemistry, Therapeutics, &c., he must be adapted to this purpose; he must have great powers of application, be a close observer and experimentalist, and in fine, have all the qualifications which will enable him to succeed in his work. In selecting, therefore, his special undertaking in the profession, he who would have a reasonable hope of attaining success, must have intelligence, honesty, application, and especially *adaptability*.

We now come to the third division of our subject, and ask, "What is the best means of preparation that will lead to success?" Here again much might depend upon the chosen avenue. If the object is to succeed in practical Dentistry, whether Operative or Mechanical, and these are of course the most important parts of the Art and Science of Dentistry, and the only ones that probably lead to pecuniary success, the question arises: Under what circumstances can a student of Dentistry be most rapidly and thoroughly educated, prepared and advanced to subserve his purpose? We will all agree that theory is an absolute essential even to practical success; without its influence we could neither understand cause of disease, its effect or treatment, and we would be powerless to make a proper diagnosis, prognosis, or to pre-

scribe the remedial agents to combat disease. We will also all agree that constant practice in manipulation, or the education of the hand, is equally essential; now the question arises, where can we combine theory and practice? The idea that this can be effected in the private office of a preceptor strikes me as most absurd. In the first place, in these days of advancement and progress, a knowledge of Anatomy, Physiology, Chemistry, Pathology and Therapeutics, or at least so much of them as appertains to Dentistry, has been considered and is acknowledged to be necessary as preparatory branches to the working departments of actual Dentistry, and if Dentistry is to be raised from an Art to a Science, this is unquestionably the case. Well, now, what individual practitioner has had the time or ability to work up all these different branches sufficiently well to teach them? and if, in isolated cases, such individuals can be found, have they the time to spare to educational purposes? Who can afford to take his valuable time from his patients, and from his practice, (his means of living) and give it to a Dental Student? In the meantime, what would become of his family? How could he live? We all know that teachers receive less pay for their services than almost any other class of persons; who would sacrifice his pecuniary interests in this way? Again, let us suppose that one so philanthropic could be found, what practitioner could take the liberty or responsibility of turning one of his pay patients over to the tender mercies of a student's first operation? This would be heroic practice indeed, and such a procedure would soon empty an office of all persons seeking dental treatment, who expected to pay for it. I think you will agree with me in considering the whole thing impracticable; I might say, impossible. The private office, then, can give neither the theory nor practice desirable. In a late meeting of the Virginia State Dental Society, at which I had the honor to be present, Dr. W. W. H. Thackston declared that he never would take a student, because of his inability to do him justice. If Dr. Thackston, than whom there could not be a better type of what the future dentist should be—an educated gentleman, and an ornament to the profession—*refuses upon these grounds*, who will have the temerity to declare himself equal to the task? To assume such a position, would inevitably lead to chaos in dental preparation and education, and be retrogressive to an extent which, I am sure, no thinking man in the profession could give his consent. Again, we have been in our last remarks supposing that an individual practitioner could be found who was equal to the whole task of preparing and educating a student of Dentistry, but failed

only in effecting his purpose owing to the value of his time to others, as well as himself, and to the deficiency of practical operations in which the student could engage, and thus made the system an impossible one. Now on the other hand, let us suppose such an avenue of dental education opened by the consent of the profession at large, to all aspirants to the position of teachers of Dentistry, it might end as in one case that I know of, where a dentist gives for $10.00 each, his course of instruction for thirty days to all comers, and winds up by confering his certificate of proficiency.

I assume the position that it is much better for a student to have no preparation at all, and commence the profession with a clean slate, than to be improperly instructed, and thus have to unlearn all that has been taught him, which is always a difficult task to both teacher and pupil—"as the twig is bent the tree is inclined." Lately, an old proposition, which was thoroughly discussed and voted down years ago, has been resurrected and urged with great pertinacity. The idea is, that the best means of educating a dental student, is first to graduate him in medicine, and then place him in an office under a practical instructor to learn his profession. While I think I have clearly demonstrated that the latter is an impossibility, or at least nearly so, I will take the ground that the first part of the proposition is equally absurd. A man does not require to be a finished physician to be a dentist, any more than a physician requires to be a finished dentist.—Neither of these addenda are necessary to success in the different professions. I have no objection to a man learning the preparatory branches of Dentistry in any way that is most convenient and agreeable to him, at a medical school or elsewhere, and as much of them as he pleases; but I do say, that after he has been graduated an M. D., his real dental education will still have to begin, as medicine teaches nothing of Dentistry, and such a course would involve double expenditure of time and money; besides we are unwilling that the success or standard of our profession should be influenced by the actions of medical schools. The medical man has no special interest in our profession; as a rule, they only tolerate us upon the condition that it is their interest so to do, and such a course would have a tendency to wipe out all our distinctiveness of specialty, and undo all that the Fathers of Dentistry have worked to achieve. To wind up, therefore, I am free to say that only through well regulated Dental Colleges can this preparation be obtained; so much of medicine in the preparatory branches of Dentistry as is necessary, is there taught, and by medical graduates, too, and who can

draw a distinction between the medical professor who lectures in a dental school, and the medical professor who lectures in a medical school —I mean, so far as the ability to teach is concerned; both have received like degrees and the same instruction. The only true difference is this: the medical man who is a dentist, knows what of medicine is most valuable and essential to Dentistry, and therefore does not waste his own time or that of his pupils in trying to make them finished physicians; (that is the business of medical schools,) while on the other hand, the medical man who is a physician, devotes his time and energies in trying to make his pupils physicians, and ignores all knowledge of Dentistry beyond the principles of general surgery; and now, in reviewing the question of education in both medical and dental schools, I will ask, where do students get the best training and preparation which most fits them for their respective duties and calling?

As far as the medical student is concerned, I answer, *in the hospital*, where he studies disease at the bedside and becomes familiar with it in all of its stages, changes and characteristic symptoms; here, in a comparatively short time he meets with all kinds and conditions of disease, and he learns, practically, to combat them; here in consultations he learns the views and experience of different medical practitioners, and it teaches him liberality of thought, and diffuseness of ideas, and opens to him the ways and means of success; here he practically learns to first apply theory, and here he feels his first need of the preparatory branches; everything centres here; this is his working department. Well, what the hospital is to the medical student, the infirmary is to the dental student; he sees all of Dentistry here, he here first feels *his* need of the preparatory branches; here he first applies his theory; here, from contact with different operators, he gathers variety of opinion and experience, variety of thought, variety of treatment, and the peculiarities of different styles of different operators; here he learns through observation the power of discrimination, and it keeps him out of dogmatical grooves and makes him liberal both to the profession and himself. What private practitioner of Dentistry can furnish such opportunities as these to students? Under what other circumstances can he be taught and properly instructed in his profession? Can he find these advantages anywhere except at dental schools? We think not, and hold, therefore, that Dentistry can only be properly taught in Dental Colleges, and that, therefore, this is the best means of preparation to attain success, and to this proposition I do not think there will be a dissenting voice.

ON THE MICROSCOPICAL STRUCTURE OF FOSSIL TEETH

FROM THE NORTHUMBERLAND TRUE COAL MEASURES.

*By W. J. BARKAS, M.R.C.S.E., L.R.C.P., London.

Fishes being the lowest class of animals in the sub-kingdom of Vertebrates in which teeth are present, naturally come first under our consideration. This branch of Palæontology is at the present time in a very immature state, for active investigations into the faunæ of the Coal Measures only commenced a few years ago. As a consequence of this insufficiency of research, there is a certain amount of doubt as to what genera many of the teeth belong. Confusion is also not seldom caused by hasty conclusions being drawn from the examination of a single specimen. Thus, Professor Owen raised to the dignity of new genera two teeth under the names Pternodus productus and Ochlodus crassus, and described and figured them very accurately in a paper on the "Dental Characters of Fishes," (Plates V. and XI.), which he read before the Odontological Society a few years ago. Now, these are not new at all, but simply different views of a tooth of Diplodus, a genus which was founded by the late Professor Agsssiz some time previously. His errors do not end here, for in the whole of that paper there is hardly one tooth that he describes and makes the foundation of a new genus that had not been previously described, figured, and named; even this is not all, for he gives a description and drawing of what he considers to be a new tooth, viz., Dittodus divergens, but which is not a tooth, being a tubercle, probably of Ctenacanthus. From the above it will be seen how difficult it is to draw up out of this chaos any classification of the Coal Measure fishes; and when it is remembered that genera have been founded upon teeth alone and upon spines alone, the difficulty will appear none the less. Fortunately, however, the latest investigations tend to simplify all this to some extent, and they partially clear the way for the probability that some of the genera founded upon spines will be ultimately proved to belong to genera founded upon teeth; thus, the spines of Ctenacanthus belong in all likelihood to the fishes Hybodus or Cladodus, of which only the teeth are known in the

*We have from time to time taken articles from the *Monthly Review of Dental Surgery*, a very excellent Journal, published in London. Each number for more than a year has contained an article by W. J. Barkas, M.R.C.S.E., L.R.C.P., on the Microscopical Structure of Fossil teeth—illustrated by a well executed lithograph of the specimens described. These articles are highly scientific—too much so, perhaps—for the pages of a magazine which one hardly expects to take up for such protracted study as he would bestow upon a text-book.

We however, take pleasure in giving our readers a specimen article from the series, with its accompanying illustration. (See Frontspiece.)—ED.

Coal Measures. The late Professor Agassiz, in his "Poissons Fossiles," suggested that the Selachian spines might belong to the same genera as the teeth of Hybodonts and Cestracionts, and gave his suppositions as to which spines and teeth belong to the same fish, but for these suggestions he had not the slightest proof. In the face of all these obstacles I have attempted to draw up a classification embodying all the genera in our measures that are known up to the present time, but with regard to many of them it is difficult to say to what family they belong. Of the classifications published by Owen, Huxley, Dana, Copes, &c., I prefer that of Huxley : but as many of the teeth are not named in his works—or, as I think, classified wrongly—I have used my own judgment as to what family they should be arranged under ; and if space permit I shall, in describing a tooth, state my reason for supposing it to belong to the family in which I have placed it. In every case where there is room for much doubt as to the classification of a genus, a note of interrogation has been placed after it.

Class.—Pisces.
Order.—Elasmobranchii.
Sub-order.—Holocephali. No representative in our Measures.
Sub-order.—Plagiostomi.
Family.—Selachii.
Sub-family.—Squali. No representative.
Sub-family.—Hybodontes.
Genera.—Diplodus, Pleuracanthus?, Cladodus, Hybodus, Ctenacanthus?.
Sub-family.—Cestraciontidæ.
Genera.—Ctenoptychius, Pœcilodus, Pleurodus, Petalodus, Gyracanthus, Orthocanthus, Leptacanthus.
Family.—Raiæ.
Genus.—Climaxodus (?).
Order.—Ganoidei.
Sub-order.—Amiadæ. No representative.
Sub-order.—Lepidosteidæ.
Genera.—Palæoniscus, Pygopteris, Gyrolepis, Acrolepis, Cycloptychius.
Sub-order.—Crossopterygidæ.
Family.—Polypterini. No representative.
Family.—Saurodipterini.
Genus.—Megalichthys.
Family.—Glyptodipterini.
Genera.—Rhizodus, Rhizodopsis, Strepsodus, Archichthys (?), Orthognathus (?).
Family.—Ctenododipterini.
Genus.—Ctenodus (?).
Family.—Phaneropleuron. No representative.
Family.—Cœlacanthini.
Genus.—Cœlacanthus.

Family.—Chondrosteidœ. No representative.
Family.—Acanthodidœ.
Genus.—Acanthodopsis (?).
Family.—Pycnodontidœ.
Genera.—Platysomus, Amphicentrum (?).

The remains of Elasmobranchs consist of teeth, spines, tubercles, masses of cartilage, and a substance which has all the appearance of shagreen. These fishes having a purely cartilaginous endo-skeleton, are never found entire, as it is well known that cartilage could not have withstood decomposition for a long enough period to allow of its complete preservation by becoming embedded during the slow deposition of the carboniferous strata. Some of the genera of this order are founded upon spines only—viz., Pleuracanthus, Ctenacanthus, Gyracanthus, Orthocanthus, Leptacanthus; with these, therefore, we have nothing to do directly, but I shall probably refer to them in describing some of the teeth.

Ganoids have an osseous endo-skeleton, teeth, and scales; therefore many portions of them are discovered, and the whole skeleton is sometimes found nearly perfect.

Selachian fossil teeth present many of the characteristics of the teeth of modern sharks, being mostly compound, conical, or pavement-like, not situated in sockets, nor anchylosed to jaws, and having a somewhat similar microscopical structure.

Diplodus is a genus named by Agassiz, and founded upon teeth alone; at least he, Professor Owen, and most other palæontologists consider them to be teeth; but Mr. Atthey, and the late Mr. Hancock, in a conjoint paper which appeared in the "Transactions of the Northumberland and Durham Natural History Society," endeavored to prove that they were tubercles; and Mr. Thompson, of Glasgow, has also promulgated the opinion that they are tubercles, and do not show the slightest trace of tooth structure. I think, however, that it is impossible to doubt their being teeth when good sections of Diplodus are examined under the microscope and compared with similar sections of undoubted tubercles, such as those of Ctenacanthus or Gyracanthus, for their shape most nearly resembles that of these teeth. Professor Owen, in Plates II. and III. of his "Dental Characters of Fishes," has unintentionally given two excellent drawings of different sections of Gyracanthus tubercles. I say unintentionally; for he did not consider them as tubercles, but as teeth, each belonging to a different genus. He named them Dittodus divergens, and Mitrodus quadricorius. The teeth of Diplodus

vary in size from one-eighth to three-quarters of an inch in length, and consist generally of a deep rounded base, having a distinct round tubercle on its anterior surface; from its superior border spring two large and one small denticle, (*a*) the small denticle being situated between and behind the two large ones; this is exactly the reverse of what is found in the sharks of the present day: in some few cases there are more than three denticles, but this form is very rare. I have only one in my possession. The denticles are variable in form, some being thick, short cones, divergent and much curved; others are elongated, comparatively thin, almost parallel with each other, and slightly recurved; in both these varieties the denticles are acutely pointed, and the curve is from before backwards. Figs I. and II. show very clearly the shape of a typical tooth, the first being a front view, and the other a side view, and therefore necessarily only showing one denticle with that peculiar prolongation of the base, which caused Professor Owen to believe it to be a new tooth, and which he named Pternodus productus. These teeth have been twice discovered by Mr. Atthey on a slab of shale, in company with a tissue closely resembling shagreen; and Agassiz also mentions the finding of similar slabs. They have also been found by other local palæontologists, embedded in masses of tissue which were thought to be either cartilage or coprolite; but on examining a specimen under the microscope, I found it to be to a great extent disintegrated cartilage. I am glad to find that I am corroborated in this fact by Professor Williamson, who states in his "Investigations into the Structure and Development of the Scales and Bones of Fishes," published some years ago, that he had found the teeth embedded in a tissue which he proved to be cartilage. These discoveries lead to the inference that the fish to which these teeth belong had a cartilaginous endoskeleton and an external covering of shagreen, and that therefore it belonged to the Plagiostomi. The shape of the teeth helps us to classify it still further, for it shows us that it is a genus of the sub-family Hybodontes. So far, all seems very natural; but if we are to draw deductions from finding these teeth occasionally buried in cartilage, or associated with shagreen, then the above conclusion may not be the right one, for the spines of Pleuracanthus are sometimes found in juxtaposition to them. Now these spines differ from all other fossil spines, and from spines of all existing fishes, with the exception of some of the

(*a*) In fig. I. the small centre denticle has not been inserted, from an oversight. The point of it should be seen projecting just above the junction of the two lateral denticles. Fig. III., however, shows a portion of it, the remainder having been ground away in making the section.

Rays; therefore, reasoning from analogy, the fish having this laterally denticulated spine, will in all probability be one of the Ray family, or closely allied to it; but then, no Rays have teeth similar to those of Diplodus, though they have a cartilaginous endo-skeleton. If, therefore, their occasional discovery together allows us to suppose that they pertain to the same fish, then that fish belongs neither to the Plagiostomi, nor to the Rays, but must be considered as an intermediate family between those two.

A section of the tooth shows that it is formed of vascular and unvascular dentine, but the former structure predominates, for the whole of the base of the tooth and the tissue within the pulp cavities of the denticles are composed of it. The medullary canals in the base of the tooth branch, and anastomose very freely, so that it is impossible to define their course; but this occurs less and less frequently as they approach, and when they have entered the osteo-dentine of the pulp cavity; here the canals are much smaller than at their commencement, and run more nearly parallel with the axis of the tooth. In fig. IV. is exhibited a section in which the canals pass principally along the sides and through the centre of the pulp cavity to its apex, where they join together to form one canal, which proceeds up the remainder of the denticle; this single canal is more clearly shown in fig. III. *(a)*, and it will be observed that the canal is irregular in shape, consequently causing the thickness of the dentine to vary; it measures 1-500th of an inch in diameter at its broadest part, which is just above the junction of the canals proceeding from the pulp cavity. This is a great deal larger than the other canals of the tooth, with the exception of those close to the base. The minute structure of the osteo-dentine in the Sections III., IV., and V., is very peculiar, for no calcigerous tubes spring from any of the canals except those running up the sides of the pulp cavity, and then they only arise from the side next to the unvascular dentine, into which they proceed; in this respect it certainly differs from ordinary vascular dentine, and it differs also from true bone, for there are no lacunæ or canaliculi.

(*a*) Fig. III., I think, requires a little explanation with regard to the rounded shape of the denticles, for they are not round, but acutely pointed and curved backwards. This section has been made from behind forwards, so that the points have been rubbed completely away, leaving the rounded edge of the body of the denticle; exactly the same thing would occur in making an *oblique* section of a cone below its apex.

A MOUTH without grinders is like a mill without a stone. A diamond is not so precious as a tooth.—*Don Quixote.*

THE
Morrison Dental Chair.

Price $150.00, or, with Castors, $160.00. Boxing, $5.00.
Spittoon Attachment, $8.00.

It possesses great superiority over any chair before offered to the profession, and is at the same time less expensive than any other first-class chair. Some of its points of superiority we here enumerate:

1st. All the advantages of any low-based chair, and also of any high-based chair, are here secured in a single chair. In it the patient can be placed lower than in the lowest-based chair made, or higher than in any other of which we have knowledge. At its lowest position the seat is fifteen inches, and at its highest position forty-two inches above the floor.

2d. The operator using the Morrison Chair can either stand or sit at his work, as he may choose, working with equal convenience in either position.

3d. It has been a very general complaint that dental chairs are too wide at the back, so holding the operator away from his work. Here this difficulty is overcome. The chair is narrow at the back, so that the operator need not stretch to reach the patient, but *can lower either arm of the chair out of the way* and so be as near the patient as he may choose.

4th. It can be changed from its lowest to its highest position in seven seconds—a celerity impossible in any chair raised by a screw.

5th. It can be very readily and perfectly adapted to operations on children of any age

First. Because in it the child can be raised as high as needed for the tallest operator.

Second. It provides a comfortable back and head rest, exactly as for grown persons.

Third. The footstool can be lengthened or shortened, to suit children of any size.

6th. The back of the chair can be lengthened or shortened rapidly and at will.

7th. The lower part of the back can be thrown forward to support the small of the patient's back.

8th. The chair, when adjusted to any position, is firm or steady wherever placed, and this is *especially true of the head-rest.*

9th. It occupies less room than any other operating chair.

10th. Although the footstool, when at its extreme length, is much longer than any other made, yet a person of ordinary weight can stand on its extremity without tipping the chair.

Nota Bene.—We have substituted brass cogs and castings, for those that experience has shown in any degree faulty, and the chair, *as now sold, is as strong as any chair made.* Reference is made to this because several of the chairs first sent out, failed in the cogs by which the chair is raised, and in the castings which throw the lower back-pad forward. These have been replaced in every instance with brass cogs, without charge on our part, and to the complete satisfaction of the purchaser.

We are gratified in being able to refer to the commendations, which follow, from some of the leading practitioners of the country.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

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10 W. 11*th St., New York, July* 24*th*, 1873.

MESSRS. JOHNSTON BROS., Broadway:

I find your Morrison Chair gives great satisfaction. My patients all admire, and voluntarily pronounce it the easiest they ever sat in. The movable back-piece, arms and foot-rest, which latter the patients can adjust at pleasure without changing their position, the lowering of the whole chair, which admits stepping into it without the slightest inconvenience, are points which call forth immediate praise from the patients, and give great satisfaction to the operator.

As a child's chair it is invaluable; the little patients can be "put just where you want them," while the operator can with ease change the position of the *whole* chair, without disturbing the patient in the least. These points, combined with others which it has, make this chair the most desirable of any which I have seen. Very respectfully yours, A. L. NORTHROP.

JOHNSTON BROS., *Hartford, June,* 15*th*, 1873.

GENTLEMEN: I have used the new Morrison Chair several hours every day since its arrival here, and feel in duty bound to say that there is no chair manufactured that can compare with it.

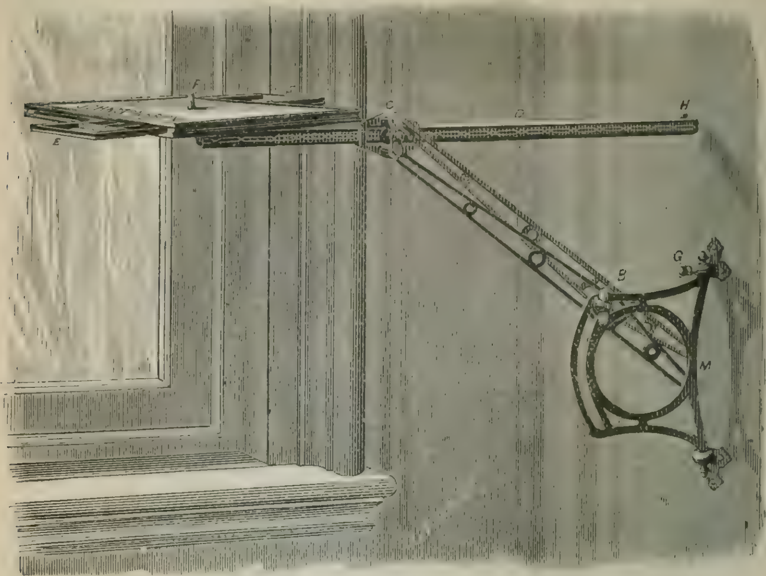
Its adaptability to children as well as adults, support for the small of the back—in fact, all its motions are perfect, and I see no chance for improvement. Dr. Morrison and yourselves have my heartfelt thanks for the great benefits you have conferred upon the profession in perfecting the chair as well as the Dental Engine. Very truly yours, GEO. L. PARMELE, M.D., D.M.D.

MESSRS. JOHNSTON BROS., *Hartford, July* 24*th*, 1873.

DEAR SIRS: The Morrison Chair meets all my expectations. I like it very much; in fact, I feel perfectly satisfied that I have one of the most complete chairs yet made for the comfort of patients and the convenience of the operator.

Yours truly, JAS. McMANUS.

MORRISON DENTAL BRACKET.



PRICES.

With Black Walnut Table, 12 inches square..................................$25.00.
With Rosewood Table, 14 inches square, and Velvet Top, and Drawers about five-eighth inch deep, lined with Leather.. 40.00.
The Rosewood Table alone, as above, to fit any Morrison Bracket............... 17.00.
Boxing....... ....$1.00.

The cut represents the table in its highest position, and distant from the wall a little more than half the distance it is capable of taking. By loosening the thumb-screw B, and allowing it to rest in the bottom of the slot, (instead of at the top as represented here,) the table will occupy a position as much below M as it now does above the same point. The extreme range, that is, the distance between the table when at its highest and its lowest position, is 24 inches.

M represents a metal frame which is secured to the wall or other support by screws. It swings from side to side as a gate on its hinges. C. M. represent light but strong metallic arms, hinged at M as a centre and moving up or down. At B is a thumb-screw passing through a slot in the frame M. By it the arms can be firmly clamped at any desired height.

At C is a slide-rest through which the hollow rod D passes freely, and may be clamped at any distance from its ends. At one end of this bar a square table is supported, having in it foil and instrument drawers. This table is capable of rotation round F, which is the burner of an alcohol lamp, the alcohol being contained in D and introduced at its further extremity H. Among the advantages of this bracket are these:

1st. It combines a greater variety of range and movement than any other.
2d. It is rigid in whatever position it is clamped, and will hold 15 lbs. with steadiness.
3d. It provides a clean receptacle for foil and instruments.
4th. It is obvious that a square table is very much more convenient as an instrument stand than a round one.
5th. Its drawers extend through the table and can be opened from either side.
6th. To those having a Morrison Chair it is almost indispensable, as it will follow the chair to either its lowest or its highest position.

It is handsomely ornamented and nickel-plated throughout, so that it is a very beautiful addition to the furniture of the operating room.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

REMODELED
Morrison Dental Engine.

New York, May 25, 1874.

Johnston Brothers.

Gentlemen:—You ask my opinion of the Remodeled Engine:

I have now used mine two weeks, and would say that its advantages to the operator over the old style are nearly as obvious as were those of the first Engine over hand work. John T. Metcalf.

The cut on the following page well illustrates the new Engine, and, with the subjoined description, will make the alterations plain to all.

DESCRIPTION.

1st. The rocking movement of the upright standard is abandoned, and a rigid, handsomely plated, and tapering column substituted.

2d. From the top of this column extends an arm directly in front of the patient. This arm swivels upon the column, and is adjustable vertically, being secured by a brace at any height desired, thus bringing its end directly in front of the patient's mouth, whatever be the height of the operating chair.

3d. Attached to the end of the adjustable arm by a most ingenious universal joint, is a shaft about twelve inches long (corresponding to the extension arm of the old engine), which carries at its end the handpiece.

a. This shaft, being short, is much lighter than the old one, enabling the operator more perfectly to feel his work, and is also less liable to tremor.

b. Both sides of the mouth may be reached without changing the position of the engine.

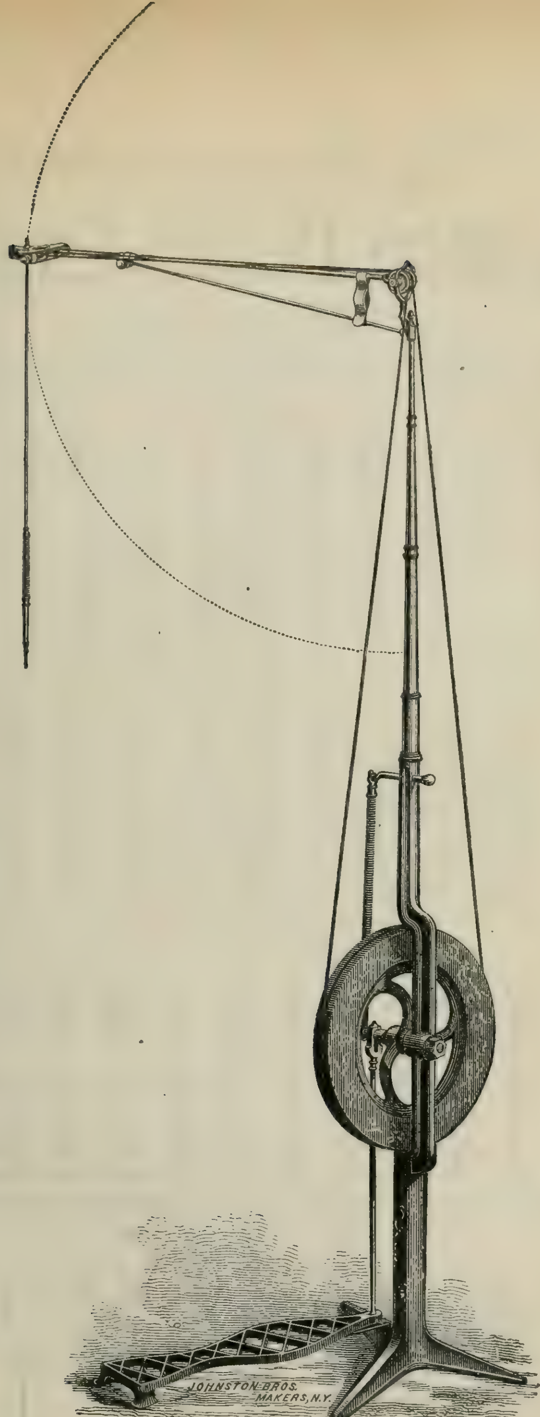
c. By lowering or raising the adjustable arm, according as the operation is upon the superior or inferior teeth, the driving spring is but slightly flexed, and great steadiness secured.

4th. The off-centre spring is attached above the driving wheel, partially supporting it and reducing the friction.

5th. The handpiece is much smaller, and the burs so secured that they may revolve in either direction, and at the same time be used either with a pushing or pulling cut, and this without the use of a catch spring. Old style burs can be refitted to this handpiece.

The model engine of this pattern, as above described, has been for several weeks in use in the hands of one of the best operators in our city, and is pronounced by him a very decided improvement.

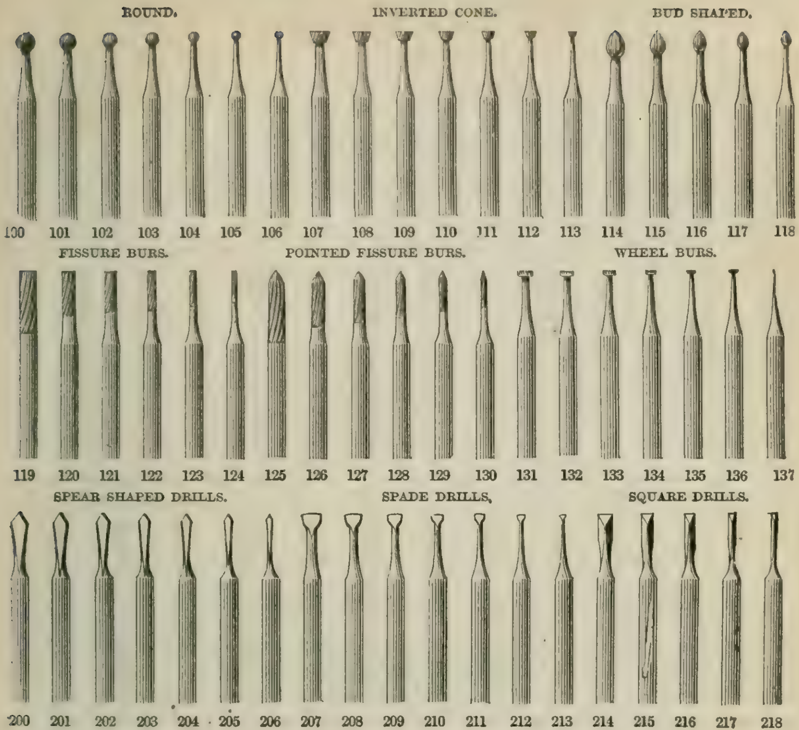
JOHNSTON BROS.

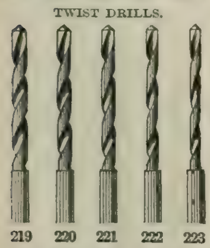


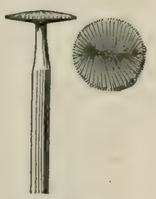
REMODELED MORRISON ENGINE.

Price, $60. Right Angle Attachment, $5. Boxing, $2.

CAVITY INSTRUMENTS.







Price, $1.25.

CAVITY INSTRUMENTS FOR RIGHT ANGLE ATTACHMENT.

We have in stock, and can furnish *Cavity Instruments* for the *Right Angle Attachment*, of all styles and sizes, from Nos. 100 to 218, inclusive.

SCOTCH STONES, MOUNTED.

The Scotch Stones enable the operator to give a finish to fillings hitherto unattainable, and only need a trial to be appreciated. We have these in stock of forms Nos. 75, 77, 80 and round. Other kinds of stones are now in process of manufacture.

HINDOOSTAN STONES, MOUNTED.

Forms of Nos. 75, 77, 80, and round. Of each shape we make three sizes. The cuts referred to by the numbers represent the large size. These are, beyond doubt, of the greatest utility in cutting either gold or bone. They last longer than any other stone.

LEATHERS, MOUNTED.

We have in stock Leather Points mounted on Mandrils, of forms Nos. 75, 77, 80 and round, designed to be charged with powders, for polishing and finishing fillings.

Screw Mandril. to be armed with leather, wood, etc., for polishing fillings, cleaning teeth, finishing plates, etc.

PRICES.

Finishing Burs,	Per dozen,	$6 00
Stoned Finishing Burs,	Each,	1 00
Cavity Instruments and Screw Mandril,	Per dozen,	3 00
Stoned Cavity Burs,	Each,	50
Right Angle Cavity Instruments,	Per dozen,	3 00
Leathers, Mounted,	"	3 00
Hindoostan Stones, Mounted,	"	6 00
Scotch Stones, Mounted,	"	3 60
Burnishers,	"	9 00
"	Each,	0 75
Corundum Points, Mounted,	Per dozen,	1 50
" " not Mounted,	"	0 75
Bands for Engine,	"	1 50
Twist Drills	Each,	40

IN ORDERING INSTRUMENTS, DESIGNATE THEM BY THEIR NUMBERS, AND STATE WHETHER THEY ARE WANTED TO FIT THE (A,) (B,) OR (C) HAND-PIECE.

Hand Piece, Style A. 

Hand Piece, Style B. 

Hand Piece, Style C. 

We can alter A or B burs to style C, at 25 cents per dozen.

When sending burs by merchandise mail for alteration or repair, attach your *card* or *printed address* to the outside of the package—do not write it. Send at same time a letter containing your count of the burs, and directing the disposition you wish made of them.

☞ Our instruments are all made of the best Stubs' steel. We shall spare no effort to make them equal in every respect to anything offered to the profession.

☞ We are constantly adding new forms and sizes of Plug Finishing Burs, Cavity Instruments, Drills, etc.

DIRECTIONS FOR USING THE ENGINE.

1. In lifting the engine, be sure *not to bend* the arm which carries the hand piece.

2. Whenever the least noise is heard, oil the engine with the best sperm oil. The rapidity of motion renders oil a necessity.

3. The only part at all likely to break, is the small spring, which conveys power at the upper end of the hand piece. It is not soldered to the shaft, but is slipped on by hand. To put on a new spring, take hold of it near the end opposite that you apply to the shaft, and twist as if to *uncoil* the spring, at the same time pushing the spring on to the shaft. You will be greatly aided in removing the broken parts, by twisting, as if to uncoil, the spring. A piece of emory paper will be found convenient to aid in holding the polished shaft.

4. The engine, to run satisfactorily, should be oiled daily ; and the driving-spring should be perfectly straight.

IMPROVED INSTRUMENTS.

WE HAVE ADDED to our list three new and very popular sizes of Cavity Burs. One round called 106½, one inverted cone called 113½, one wheel-shaped called 137½. Each is smaller than any before made by us, of its shape. These numbers are neatly put up in dozen and half dozen packages, and are completely protected from oxidation and from rubbing against each other in transportation.

They are very popular, and we frequently receive orders from dentists for from one to three dozen of each.

STONED BURS FOR BURRING ENGINES.—For some time past, we have made to order, a Bur for use in Burring Engines, by the following process: The teeth of the Bur being laid out with extreme accuracy, are filed to *exactly the same length*, but are not brought to a cutting edge. The Bur is now tempered, and each tooth *afterwards stoned to a fine edge*. This secures a Bur perfect in all its cutting edges, and unequaled by anything hitherto offered in the market. Of these we are provided with a limited supply, of both Cavity and Finishing Burs, excepting Fissure *Burs*. (See Price List.)

THIN BOXWOOD DISCS for carrying Polishing Powder, to polish fillings in proximal cavities. These are of four sizes, from ⅝ inch to 1 inch diameter.

WE ADD THAT THE INSTRUMENT-STAND, elsewhere illustrated, will be found very useful for the convenient keeping of the Engine Instruments while not in actual use.

Besides the form represented in the cut, we have them with smaller holes, and very many more of them, so that each Bur may be kept by itself.

WE INVITE the fullest examination of our Engine Instruments, as regards

The quality of the steel from which they are made.

The shape and finish of the cutting edge.

Their temper.

The rapidity with which they cut.

Their durability.

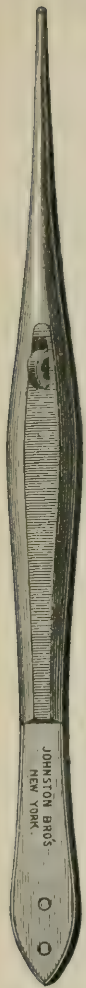
The shaft of each instrument is *round and highly finished*, and can therefore be used without unreasonable and unnecessary injury to the nose of the hand-piece, which injury occasions unsteadiness in all the uses of the Engine.

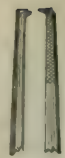
They will *bear* examination in *quality* and *price*.

JOHNSTON BROS.

ARTERY AND TAPE FORCEP.

REMODELED BY DR. E. A. BOGUE.





These are designed for *firmly* grasping corundum or silex tape, or floss silk, when it is desired to use either of them in the mouth, for inserting or removing tape, rubber wedges, etc., or for grasping arteries, pendulous portions of the gum or other parts during amputation. The points are so formed that they interlock in the substance of the material to which they are applied; and, when they have once taken hold, a spring-catch in the side of the forceps fastens them in position, so that it is impossible for them to slip. They render it almost unnecessary to handle tape or floss silk with the fingers in a patient's mouth.

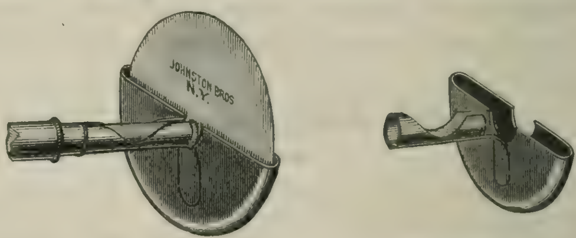
They are also convenient when one wishes to withdraw silk or gilling twine which has become fastened between the teeth, or to remove wet napkins or wooden wedges.

Price, Nickel-plated................$2 75

JOHNSTON BROS.,

812 Broadway, N. Y.

Ives' Tongue and Cheek Protectors.



These admirable little instruments are a protection to the patient, the operator, and to the disc.

They are of two sizes, and together will answer for Arthur's disks of any usual size.

The lips which clasp the nose of the hand-piece are left soft, and can be spread or contracted to snugly fit the A, B, or C hand-piece.

Price, per set..................................$3 00
Each.. 1 50

JOHNSTON BROS.

1,000 FINE

Gold Foil.

PRICE REDUCED,

QUALITY UNIFORM.

We are constantly in receipt of Letters from those who are using this Foil, substantiating all we have ever claimed for it.

We *can* make a cheap Foil, but *cannot* afford to give it the treatment that is given to the Gold from which this 1,000 Fine Foil is made.

Do not sacrifice your patients and your practice by using an inferior quality of Gold Foil! There is no more expensive way of saving (?) from twenty-five to fifty cents per book.

SOFT FOIL A SPECIALTY.

Price of all Regular Numbers, ...	$4 50 per Book.
By the Half Ounce, ...	16 50
By the Ounce, ...	33 00

No. 2 is Twenty-five Cents per Book extra.

SOLD BY ALL DENTAL DEPOTS.

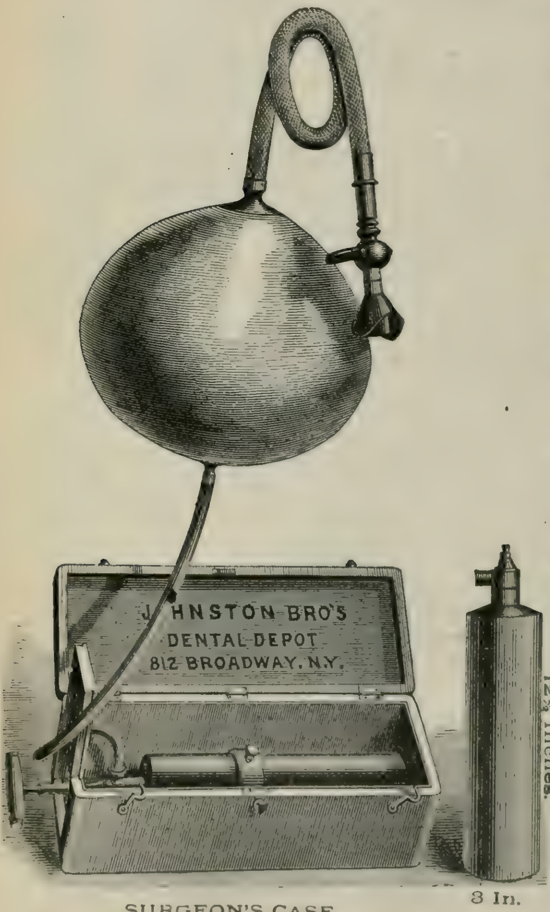
JOHNSTON BROS.,

Depot, 812 Broadway, N. Y.

LIQUID NITROUS OXIDE.

[Revised Circular.]

The increased and still increasing demand for Pure Liquid Nitrous Oxide, and for information concerning apparatus for its exhibition, renders it necessary that we issue yet another edition of our circular upon that subject As the Surgeon's Case, as first introduced, has proved itself in every way all that we could wish it to be for the place assigned to it, we cannot do better than to repeat here our first description of it.



SURGEON'S CASE.

This comprises a strong cylinder containing One Hundred Gallons of Gas; a strong morocco covered case, provided with an iron ring and set screw, by which the iron cylinder is held in place during use, and its delicate valve protected from injury; also, a rubber bag with rubber tube at one end for admission of gas, while an inhaling tube, handsomely covered on its outside, and provided against any possibility of a collapse by a tin-coated spiral of wire on its inside, is fastened at its opposite end—an inhaler—a nickel-plated wrench and a nickel-plated key. In fact, *all* the apparatus necessary for administering the gas. The whole case and contents weighs about fifteen pounds. This is here shown as open, and the bag which receives the gas from the cylinder, and from which it is exhibited to the patient, is represented as filled, and suspended above the case. The cylinder is also shown as standing at the side of the case. This is the simplest and most popular form of apparatus, and will be everywhere welcomed—because of its portability for use outside of the operating room.

REVISED PRICES.

Complete Apparatus — Surgeon's Case, with Metallic Inhaler.... **No. 1.**..........	$42 00
Complete Apparatus—Surgeon's Case, with extra sized Bag and Metallic Inhaler.... **No. 2.**..........	45 00

Boxing either, $1.00.

Each complete apparatus includes a 100 gallon cylinder, filled with Liquid Nitrous Oxide.

Cylinder with 100 gallons of Gas..........	16 00
Refilling Cylinder..........	6 00
Morocco covered case, with ring and thumb screw, velvet lined,	12 00
Polished bl'k walnut " " " " "	13 00

Of these latter we have only a limited number.

Rubber Bag, with covered inhaler tubing, (about 4 gall. capacity)	5 00
Rubber Bag, with covered inhaler tubing, extra size..........	7 00
Inhaler, with spring valves, trumpet mouth-piece, with Plated connection..........	8 50
Inhaler, latest style, with two way stop cock, adapted to the use of both dentists and surgeons, with connection..........	9 50
Key, Nickel Plated..........	1 50
Wrench, "	50
Union, Nickel Plated, (nut and tube), for connecting cylinder and gas bag..........	1 50
Covered Inhaler Tubing, per foot..........	50
Plated Connection to fit old style Inhaler..........	1 00

REMARKS.

When the side of a bag has been perforated, it cannot be repaired, but should be replaced. Send on the tubing by mail, and the bag will be replaced. Price.......... 3 00

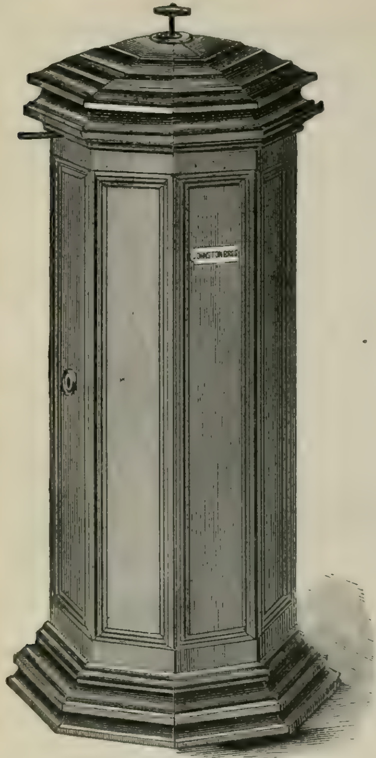
As this cannot be done *properly* except by the use of rubber cement and by persons experienced in the business, we think it every way advisable that it be entrusted to the rubber workers, and not attempted by the dentist.

JOHNSTON BROS.,

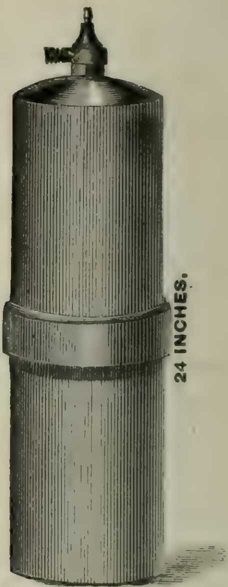
812 BROADWAY, N. Y.

ONE THOUSAND 1000 GALLONS GAS,

LIQUID NITROUS OXIDE.



1000 GALLON CYLINDER CASE.
Price, $30.00. Boxing, $2.00.



1000 GALLON
CYLINDER.
Price, $36.00.
Boxing, $1.50.

Gas in 1000 gallon lots, 4½ cents per gallon.

The above illustrated apparatus is especially desirable where large quantities of nitrous oxide are used, or where it must be sent a great distance. In this form it is best to ship it by *fast freight*—which makes the cost of transportation very light.

THE GAS CAN BE KEPT FOR ANY LENGTH OF TIME,

AND IS

CONSTANTLY ON HAND AND ALWAYS OF THE BEST QUALITY.

PRICE LIST OF A COMPLETE OUTFIT.

1 Black Walnut Paneled Case, octagonal	$30 00
2 1000 gallon Cylinders at $36 00	72 00
2000 gallons of Gas at $4\frac{1}{2}$ cents per gallon, being 25 per cent. less than price in small cylinders	90 00
1 Bag, with covered Inhaler Tubing	5 00
1 Bag, extra size, with covered Inhaler Tubing	7 00
1 Key, Nickel Plated	1 50
1 Wrench, Nickel Plated	50
1 Union, " "	1 50
1 Inhaler—Metallic—with two way stop cock and connection	9 50
	$217 00
Deduct Gas	90 00
Cost of Apparatus	$127 00

By purchasing under this plan a saving of 25 per cent. is effected in the cost of the gas, or on 2,000 gallons of $30.00.

It is right that we should here announce that we have in hand a piece of furniture, which—while it will answer the purpose of the black walnut case illustrated—will also serve as a stand for an ornamental Gasometer.

A cut of it will appear in an early issue of the DENTAL MISCELLANY.

As these large cylinders can easily be sent by fast freight (*the* 100 *gallon size is too small to be so risked*) cost of transportation is reduced to its lowest rate.

JOHNSTON BROTHERS,

812 Broadway, New York.

PORCELAIN TEETH.

Our stock is carefully selected from the factories of the BEST MAKERS, and embraces all of the varieties in use, including Continuous Gum Teeth. We will fill orders on short notice for any manufacture of teeth.

Dentists sending us their orders can rely on receiving prompt attention, and on getting manufacturers' best rates.

JOHNSTON BROTHERS.

DENTAL GUM—RED.

E Dougherty's Nos. 1 and 2, per lb	$2 75
Whalebone Rubber, per lb	3 50
Dental Gum—black—per lb	3 00
Gutta Percha, per lb	3 00

JOHNSTON BROS.

SUSPENSION DENTAL ENGINE.

(INVENTED BY DR. W. S. ELLIOTT.)

The Dental Engine represented in the accompanying plate is confidently recommended by us as sure to give general satisfaction.

Two or three years ago a few engines modeled on this, the Elliott, plan (suspension from the ceiling) were sold. Though imperfectly constructed, they have been uniformly commended by those who have used them.

Each of the two styles of Dental Engines which have found favor with the profession has advantages peculiar to itself.

In this form the driving power is belted directly to the shaft of the hand-piece, without the intervention of a flexible joint, and so *entirely avoids all the unsteadiness* or "chattering" which is almost inseparable from the flexible joint, even when short, and is unendurable where the non-rigid portion is long.

The Remodeled Engine, shown in our cut, has not only greater elegance of design than the Suspension Engine as previously sold, but, by its construction, obviates several objections to which the earlier model was liable. It was previously necessary to make the hand-piece large and heavy in order to give tension to the belt, and in furtherance of this purpose a considerable ball of metal was suspended from the rear of the hand-piece. As now made, the ball weight is dispensed with, the hand-piece being balanced and tension given to the driving-belt by placing a small pulley on the hand-piece spindle. The hand-piece is reduced to half its original weight, *and the slightest movement at its point can now be felt by the hand which guides it.* Among its advantages, those subjoined are prominent.

1st. It is more steady in its movement than any Engine made.

2d. Being suspended on a cord, it is free to move in any and every direction—hence the bur can be readily applied to any cavity, whatever may be its position in the mouth.

3d. It has an abundance of power.

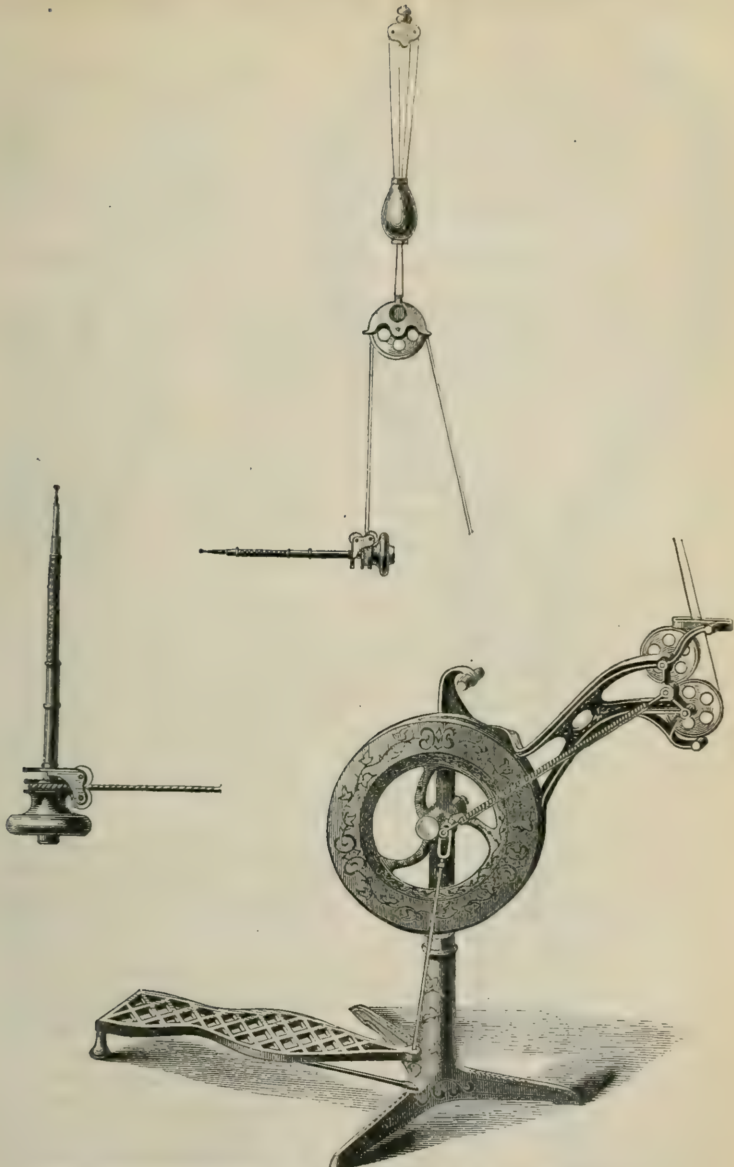
4th. It is not easily broken or likely to need repairs.

5th. It is, above all others, a "*light running*" Engine.

6th. The hand-piece, which formerly was particularly objectionable because of its size and weight, and because of the position occupied by the weight needed to balance it, is now scarcely larger than that of the Morrison Engine, and is fitted to use the same (C style) bur. For the balance-weight we have substituted *a fly-wheel on the shaft which carries the bur.* While keeping the hand-piece well balanced, this gives momentum and greatly increased steadiness to the cutting instrument.

Orders for this Engine will be entered in rotation as received, and can doubtless be filled during the present month.

JOHNSTON BROTHERS, 812 Broadway, N. Y.



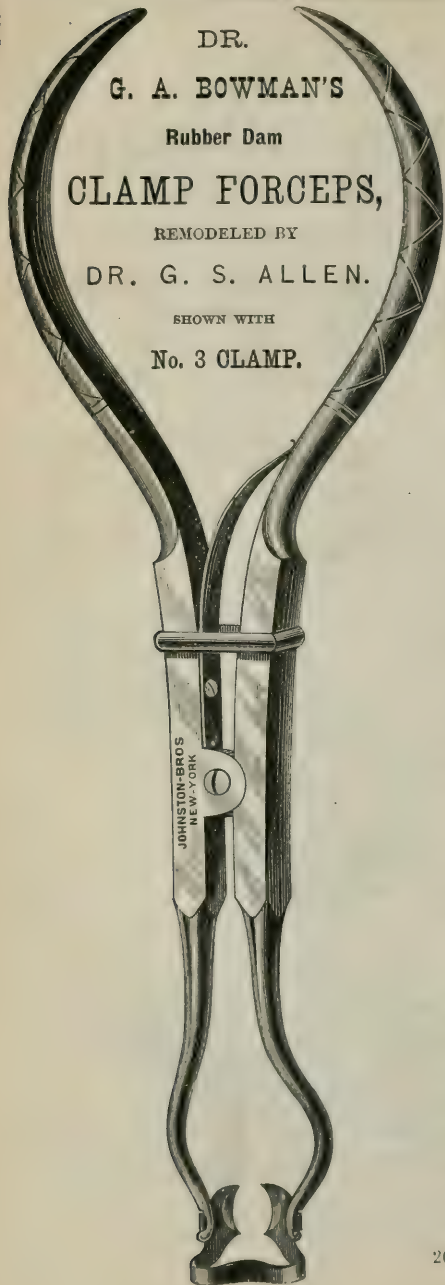
SUSPENSION DENTAL ENGINE.

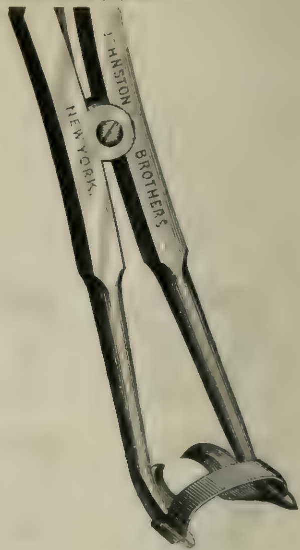
(DR. ELLIOTT'S INVENTION.)

Price, $50.00. Right Angle Attachment, $5.00. Boxing, $1.00.

RUBBER DAM CLAMP FORCEPS.

Of these we offer two styles, both deservedly popular.





POINTS OF DR. T. C. ROYCE'S

Rubber Dam Clamp Forceps,

Shown with Clamp. Handles are exactly like the other style, (Bowman's.)

Both styles of these Forceps have points accurately adapted to the shape of the clamp at the neck, and hence will be found much more convenient than those hitherto offered the profession in this point of adaptation. (See also advertisement of Clamps.)

If so ordered we can supply either style of Forcep with a band, which will keep the Forcep and Clamp extended and ready for use when the hand of the operator is removed, as shown on the Bowman Forcep.

PRICES.

Forcep, either style	$3.00
" " " Nickel Plated	3.50
Complete set of Clamps, embracing eight forms	4.00
Complete set of Clamps, embracing eight forms, plated	4.80
Clamps, each	.50
" " plated	.60

JOHNSTON BROS.

Morrison Chair—Rotary Movement.

To secure the advantage of this movement for the Morrison Chair, we have provided for it a new style of legs, having broad, ornamented feet. A gun metal roller is let into each of these feet, so arranged that the rollers on the front feet will roll laterally (in the arc of a circle), but not forwards or backwards; and a cam-lock is provided which fastens them in any desired position. This makes it easy to turn the patient to the light. As the front rollers can be locked in position, the operator can use any force he finds necessary in the mouth of the patient without liability of moving the chair in the least.

If it is desired to move the chair from its position (to clean the room) it is only necessary to lift the front rollers from the floor, and the chair rolls easily backwards or forwards on the rollers in the back feet.

PRICES.

Morrison Chair	$150 00
Morrison Chair with rollers and cam-lock	160 00
A new set of legs	25 00
Spittoon attachment	8 00

JOHNSTON BROTHERS.

Rosewood Bracket Table.

This is built up of rosewood veneers, and is highly polished. It is fourteen inches square, and provided with drawers about five-eighth inch deep, which are lined throughout with soft leather. The table is covered with a beautiful article of silk velvet. It is by far the most beautiful table we have seen.

PRICES.

Bracket, with rosewood table	$40 00
Rosewood table	17 00

JOHNSTON BROTHERS.

NOTICE.

We have filled all orders received for head-gear as per our previous announcement, and now withdraw the offer.

We find that the present head-gear requires, for the best work, a heavier standard than that on the earlier style of engine. If any insist on altering their old engine, our price for the head-gear (in exchange for the old head-gear) will be $20.00. Price of either B or C style hand-piece, $5.00. Right angle, either B or C style, $5.00.

JOHNSTON BROTHERS.

NEW YORK COLLEGE OF DENTISTRY,

NINTH ANNUAL SESSION,

1874-75.

FACULTY

WM. H. ALLEN, Emeritus Professor of the Institutes of Dentistry.

FANEUIL D. WEISSE, M. D., Professor of Regional Anatomy and General Pathology.

FRANK ABBOTT, M.D., Professor of Operative Dentistry and Oral Surgery.

ALEX. W. STEIN, M.D., Professor of Histology, Visceral Anatomy, and Physiology.

F. LE ROY SATTERLEE, M.D., Professor of Chemistry, Materia Medica, and Therapeutics.

C. A. MARVIN, D.D.S., Professor of Mechanical Dentistry.

D. W. WILLIAMSON, D.D.S., Demonstrator of Operative Dentistry.

A. RUST CUYLER, D.D.S., Demonstrator of Mechanical Dentistry.

C. P. KREIZER, M.D., Assistant to the Professor of Chemistry, etc.

Students may matriculate at any time, as the Infirmary is open, for regular students of the College to practice in, the entire year.

The regular course of Lectures will commence middle of October, 1874, and continue until the 1st of March. Three hours of each day of the week (except Saturday) will be devoted to lectures, and four hours to *Clinics,* and practice at the Chair, and in the Laboratory, under the direction of the Demonstrators.

It is with pleasure that we call attention to the removal of the College to more spacious, more convenient and permanent quarters. Our Infirmary is furnished with thirty good chairs and all the appliances. Our Lecture-room will seat, and our Laboratory will accommodate, two hundred students; all on one floor, and up one flight of stairs only.

Tickets for one year's Instruction, including Course of Lectures, Matriculation, Demonstrators', Diploma Fees, and Practice in the Infirmary the seven and one-half months between the sessions...	**$150.00**
For the Course of Lectures only....	**100.00**
Matriculation (paid but once)....	**5.00**
Graduation Fees....	**30.00**

Board may be obtained for from $4 to $8 per week.

For further information address

FRANK ABBOTT, M. D., Dean,
78 West Twelfth Street, New York.

HARVARD UNIVERSITY.

Dental Department.

BOSTON, MASS.

1874-75.

FACULTY

CHARLES WILLIAM ELIOT, L.L.D., *President.*
OLIVER W. HOLMES, M.D., Professor of Anatomy.
HENRY J. BIGELOW, M.D., Professor of Surgery and Clinical Surgery.
THOMAS H. CHANDLER, D.M.D., Professor of Mechanical Dentistry.
THOMAS B. HITCHCOCK, M.D., D.M.D., Professor of Dental Pathology and Therapeutics.
GEORGE T. MOFFATT, M.D., D.M.D., Professor of Operative Dentistry.
LUTHER D. SHEPARD, D.D.S., Adjunct Professor of Operative Dentistry.
NATHANIEL W. HAWES, Assistant Professor of Operative Dentistry.
EDWARD S. WOOD, M.D., Assistant Professor of Chemistry.
HENRY P. BOWDITCH, M.D., Assistant Professor of Physiology.
EDWARD A. BOGUE, M.D., University Lecturer on Dental Pathology and Therapeutics.
IRA A. SALMON, D.D.S., University Lecturer on Operative Dentistry.
CHARLES B. PORTER, M. D., Demonstrator of Practical Anatomy.
CHARLES WILSON, D.M.D., Demonstrator in Charge.

Instruction is given during the Academic year, commencing on the 1st of October and continuing till the 1st of July, but is divided into two terms, attendance upon one of which is required for graduation, the other not. The first, or required term, begins October 1st and continues nineteen weeks. The second, or Spring term, which begins February 15th and ends June 30th, is designed to take the place of pupilage with private instructors, and affords better and more varied instruction than can possibly be obtained in any office.

The mode of instruction in the various departments is as follows, viz. :

ANATOMY.—Lectures, recitations and dissections under the direction of the Demonstrator of Anatomy.

PHYSIOLOGY.—Lectures, recitations and practical demonstrations in the Physiological Laboratory.

CHEMISTRY.—Lectures, recitations and practical work in the Chemical Laboratory, each student having his own desk and apparatus.

SURGERY.—Lectures, recitations, operations upon the cadaver, and clinical and operative surgery at the Massachusetts General and City Hospitals each week. A course of lectures on oral surgery will be given during the Winter term.

OPERATIVE DENTISTRY.—Lectures, operations at the Dental Infirmary of the Massachusetts General Hospital. There were upwards of five thousand operations performed during the last year.

MECHANICAL DENTISTRY.—Lectures and practical work in the Laboratory. The Infirmary provides an abundant supply of patients.

DENTAL PATHOLOGY AND THERAPEUTICS.—Lectures and recitations aided by specimens, models, diagrams and the microscope.

☞ The University Degree, D.M.D. (*Dentariæ Medicinæ Doctor*), is conferred upon those who fulfill the requirements.

FEES.

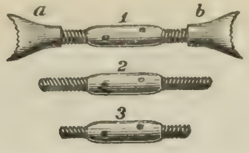
Matriculation, $5.00. Spring Session, $50.00. Winter Session, $110.00.
For the Year, $150.00. Graduation, $30.00.

For further information address

J. H. CHANDLER, Acting Dean,
222 Tremont Street, Boston, Mass.

JACK SCREWS.

Devised by Dr. C. S. LONGSTREET, with Dr. A. McCOLLOM's Improved Head.



This device is greatly prized by those who have used it.

PRICES.

Full Set, as above, Nickel Plated, screw and two extra bars ..	$2 50
Jack Screw, Nickel Plated..............................	1 50
Bars, " " each..........................	50

JOHNSTON BROTHERS.

IMPROVED TRIPLEX RUBBER-DAM PUNCH.

DEVISED BY DR. F. W. DOLBEARE.

1st. It has in convenient form for use three sizes of punches.

2d. If one size breaks it can be replaced (by mail) at trifling expense.

3d. It is nickel-plated, and so easily kept in order.

JOHNSTON BROS.,
812 Broadway, N. Y.

SECOND-HAND CHAIRS.

Dentists who have supplied themselves with the Morrison Chair frequently request us to sell the chairs previously used by them. We therefore can ordinarily supply, at cheap rates, second-hand chairs of any of the varieties hitherto most used. For particulars, address

JOHNSTON BROS.,

812 Broadway, N. Y.

SICKLE SCALERS.

A set of these consists of four instruments of the shape here represented, but with blades of varying thickness.

The blades are hardened and the edges ground square; this renders the instrument equally serviceable as a scaler or a chisel, as it has four cutting edges. No. 4, being very thin and flexible, can be inserted between the teeth.

A VERY USEFUL SET OF INSTRUMENTS.

No. 1 has a stiff blade.

No. 2 has a less stiff blade.

No. 3 has a blade that is quite flexible.

No. 4 has a blade that is very flexible.

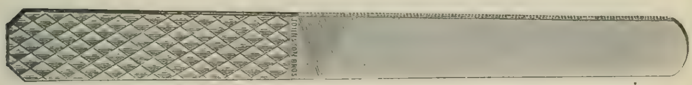
PRICES.

Set complete	$2 00
Single Instrument	50

JOHNSTON BROS.,
812 Broadway, N. Y.

SEPARATING FILES.

Maynard's Patent, May 26, 1874.



These are of the finest quality of steel, and most carefully cut.

We believe them equal to any separating file made, either here or in Europe.

They are made with Maynard's improved handle, which renders it much easier to hold them firmly, and reduces the chance of breakage.

PRICES.

No. 00,	**per doz**	**$1 50**
No. 0,	"	**1 50**
No. 1 to 6,	"	**1 25**
Assorted,	"	**1 25**

We have on hand former styles at usual prices.

JOHNSTON BROS.,
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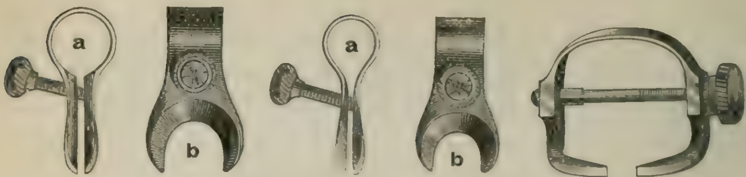
Jarvis' Separators.



No. 1. **No. 2.** **No. 3.**

The cuts above shown are full size, and represent an apparatus for separating teeth. It is almost impossible to overstate the value and convenience of the devices. By their use, without delay to the operator or appreciable pain to the patient, adjacent teeth may be forced apart for any of the various purposes for which it has been customary to wedge teeth. Crowded teeth can be readily parted by using the separators, so that rubber dam can be applied without difficulty or loss of time. Two forms are shown by the cuts ; of the first form we make two sizes, **No. 1** and **No. 2.**

The Separator consists of a piece of steel, nickel-plated, bent upon itself, having the two ends formed to fit the outer portions of the proximate surfaces of two adjoining crowns.

These jaws are forced apart by the action of a screw, which passes through one and against the other of them. This form is applicable to all the bicuspids and molars. It does not touch the gums or injure the teeth, neither does it cause pain sufficient to be of consequence. The whole instrument is drawn to a spring temper. The jaws are thin, in order to be out of the way, and also the more perfectly to adapt themselves to the surfaces of the crowns of the teeth than if they were rigid. The appliance may be left on, in many cases, while operating, or if removed the space gained by its use may be retained by inserting a wooden wedge.

The Compound Wedge, No. 3, consists of two wedges approaching or passing each other. This is especially applicable to the incisor teeth, and will be found particularly useful in making room for passing rubber dam around crowded teeth. In use, a small strip of wood should be placed over the teeth and beneath the cross-bar, to prevent the points from sliding towards the gum.

PRICES.

Complete Set of Three	$6.00
Any Single Instrument	3.00

JOHNSTON BROS.,
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Der Zahnarzt

JOHNSTONS'

Dental Miscellany.

Vol. I.——*DECEMBER, 1874.*——No. 12.

"CHEMICAL VERSUS GALVANIC ACTION ON THE TEETH."

By A. C. Castle, M.D., New York.

The above quotation is the caption given to an article published in the Dental Miscellany, Vol. 1, page 10, October number, from Mr. Thomas Fletcher, of Warrington, England. It is offered as a controverting reply to a paper read by Dr. Palmer, before the New York State Dental Society, in June last. From the tenor of the remarks made by Mr. Fletcher, I learn—I have not seen the essay referred to—that Dr. Palmer, quoting Mr. Fletcher, had made "some experiments with relation to the galvanic action supposed to exist as an agent of destruction to the teeth which are plugged with different materials." Mr. Fletcher goes on to say, "Having gone over similar ground, and with results totally different to those stated, it will be well to give the other side of the question, to enable operators to judge, and also to test the matter for themselves." It will be somewhat difficult for "operators" to understand the exact meaning of the gentleman's vague manner of expressing his dissent, as he in the same paragraph acknowledges "that there *is a distinct action visible* in a delicate galvanometer between a plug of *any material* and the tooth, *may be granted.*" He proceeds, "We will take a tooth with a practically and theoretically perfect gold plug. Any operator will acknowledge that this is a safe protection, and that it will stand unchanged under ordinary conditions for an indefinite number of years." Mr. F. continues: "As this battery (as Dr. Palmer would call it) is fully exposed to the action of the saliva, acid or alkaline food, &c., it ought to result in the destruction of the tooth; in fact, the destruction ought to be greater," (*i.e., more rapid?*) "the more

perfect the contact of the filling," and "where the plug is not in contact with the walls" (of the tooth) "no destruction should take place."

Mr. Fletcher regards the minus electro-galvanic action of tin, although not so pure as gold, to be indebted more to its plasticity, a property he seems to think it possesses superior to gold foil, and therefore "is, as a rule, better adapted to the walls of the cavity, and hence, keeps food and moisture out better than the ordinary run of gold plugs inserted."

Mr. Fletcher, speaking of amalgams, says: "Dr. Palmer's paper states they have in themselves the elements of a perfect circle, and therefore fail more readily;" concluding the paragraph: "If they have a perfect circuit and battery in themselves, they ought, in reason," (do chemical laws reason?) "not interfere with the tooth substance, but rather, having the power to saturate any acid or alkaline liquid, like any other battery, they ought to be a strong protection to it." With these vague, obscure, and indefinite remarks, Dr. Palmer is dismissed, and the gentleman proceeds to theorize upon the "peculiarities," properties and merits of amalgams, "to demonstrate practically in a visible form" —"from their very nature"— "commercial form" (?)—that they cannot "exclude moisture from any cavity in a tooth which has not received a special previous treatment." Mr. Fletcher does not enlighten us upon the mode of special previous treatment he deems proper to adopt. Does he bake them in an oven, or dry them by the sun's rays? Not at all. He says: "If the cavity cannot be dried perfectly, it must be made artificially dry, or moisture-tight. His special treatment, then, is, "to *varnish*" the interior walls of the decayed tooth. Does not the same difficulty present itself where other material is used?

Herein, or thereby, hangs a tale. I do not know of an exception wherein any one dentist ever operates upon the teeth with any other view than that of their mechanical character, and the mechanical means of patching up the holes or cavities to protect their exposed and most perishable parts from the effects of external agents. The only medical treatment is local appliances to "obtund sensitive dentine" where it is present. Dental records, annual conventions, nor local dental societies' debatings have never referred to the real cause of the difficulty, presenting itself to operators filling teeth in securing a perfectly dry surface. To secure the exposed decayed surface of bone artificially free from *external* moisture sufficiently to enable them to consolidate the gold into a solid welded mass hermetically packed against, and in contact with the protecting enamel, of which the filling is made to represent its artificial continuity, is all that the dentist affects to do, or desires, and

indeed *all* that he can attain. Extract these teeth from the jaws, dry them perfectly throughout their substance, and fill them with any material, place them in an anatomical museum, and they will last as long as any other selected bones—figuratively, forever. Place these same teeth in *moist* locations, or immerse them in liquor, not alcoholic, and they will decay in a very few years. Leave these teeth in their respective jaws, subject to the laws affecting them in their natural positions, and they last just as long as the mouth is healthful, and their density and vitality will resist the action of external agents brought to bear upon them.

Why is this? Because the substance of the teeth, including the enamel, although more dense, is *porous*, filled with tubes, into which a *nervo-vital sap* penetrates, which is changed and subject to changes like the other vital fluids of the animal system. Girdle a sapling through its bark into the *alburnum*, and it dies. Girdle a tooth through its enamel into the dental bone substance, and it decays. The nerve sap prolonging vitality and endurance in the tooth organization—this nerve sap is plugged in behind the fillings ; it is there exuded naturally, and moist, and it depends *entirely* upon the constitutional organization, or deposited *density* of the enamel, to resist the force of, and hence, the escape of, the internal exudation of the sap fluid from between the bone and the filling. The electro-galvanic action of the metals, super-exciting this nerve sap, either increases its elimination—hence congestion and tenderness in the tooth for a time limited or unlimited ; or their galvanic influence paralyzes its formation. In either case—the first resisting best,—moisture will be naturally there, and chemico-galvanic influence (of which your space will not permit me to enlarge upon) will excite the external agents to act upon the marginal enamel surrounding the filling, according to its density or porosity.

Mr. Fletcher, unfortunately, like all my professional brethren—except when talking at Dental Colleges or Conventions, &c—will depend upon the *mechanical* aspect of their *mechanical* skill alone. Doubtless they are good practical "operators," but the formative process of the dental system by which the teeth are organized cannot be overlooked, nor can the conditions of the animal system necessary to their healthful permanence, and the sources of their impairment, changes, disintegration, decay, and death, be neglected. Of their pathological conditions—that they are organized with a special dental vascular appliance with vascular functions and a special nerve and nerve "pulp" to each tooth, which eliminates a vital nutritious sap, as well as a nervous fluid penetrating

into the tubuli or "pores" of the tooth substance, reaching up to, and in many instances into, the protecting encasing enamel. That these are exposed to external atmospheric influences of heat and cold, as well as the cold and heat from iced water and ice-creams, to hot tea and hot soups, &c. That the teeth are affected by constitutional disease, and the medical agents exhibited for their relief. That they are subjected to the chemical action of *gastric* and *buccal* acids. That the bone is affected or super-excited to nervous sensibility (termed "sensitive dentine," whatever that means) or acute inflammatory action of the nerve tissue within (often of rheumatic or gouty character) producing the several bone affections, mortification and death, or necrosis. With a knowledge of the pathology of the teeth, and the medico-chemical cognizance of facts, a bold pen would be required to deny the electro-galvanic influence of alloyed or mixed metals upon the dental tissues. Even Mr. Fletcher does not fail to admit "that there is a distinct action 'visible' in a delicate astatic galvanometer betwween a plug of any(!) material and the tooth." Not a member of the faculty of the whole world, including chemists, would deny the action of the metals used by dentists, if placed in the more impressible organized bones of the osseous system, and there left for time unlimited, uncovered by the flesh—if such could be—exposed to the external and mechanical and chemical agents naturally and artificially brought in contact with, and acting upon the integrity of the teeth. Daily, medical, as well as the dentist's evidence of experience* proves in every individual, that the dental system is in direct sympathy with the sensorium connected by the fifth pair of nerves, that the teeth possess no exemption, no vital or physical prerogative over artificial, any more than they have against the natural agents of destruction.

From the tenor of Mr. Fletcher's communication, I am led to infer that the paper read by Dr. Palmer, before the New York State Dental Society, was intended to demonstrate certain experiments in relation to the various metals and metal compounds used by the dental profession, which, when filled into the cavities of decaying teeth, and hence brought into contact with acids, &c., eliminated into the mouth, produced cer-

*It frequently occurs, much to the annoyance of the dentist, that teeth whose nerves are well protected by the covering bone, soon after their being filled, without any apparent cause, are painfully affected (often *periodically*) in many instances followed by induration of the periosteum at the end of the fangs. Sometimes with an external pointing abscess terminating with a chronic running, discharging "gumboil." This is attributed to "cold," to injury done by "malleting" in gold, &c. In some instances, doubtless, these are the causes; but the majority of them is the result of the irritating electro-galvanic action of the "fillings" super-exciting the nervous and vascular tissues.

tain chemico-electro-galvanic action upon the substance of the teeth. If I am right in my conjecture, the object of this paper is to confirm and endorse the correctness of Dr. Palmer's premises, and to dissent from Mr. Fletcher's argument, which I conceive fails to disprove them.

My attention was first attracted to this subject forty years ago, observing that gold and silver plates used to secure artificial teeth in the mouth, "clasped" to decayed teeth whose cavities were filled with tin or lead—metals much used then—were little affected by progressing decay, that they were stayed, or more fixed as it were, while the contrary was observable where the plates were secured to teeth filled with gold. It will be borne in mind at the time to which I refer, forty years ago, that dentists did not know of "gold plate." They used the old Spanish doubloons rolled into the thickness required, and soldered with fine *eighteen* carat solder, a circumstance to be more remarked, because old cow's teeth and natural human teeth secured on a *bone basis* prepared from ivory of the hippopotamus tusk, and similarly fastened to filled as well as to sound teeth, did not affect them chemically; but the crowns were cut into or off at their necks by the clean *mechanical friction* of the sharp fibred silk ligatures tied round them.

The subject can be better illustrated by demonstrating the destructive process produced upon the living natural teeth by metals now used in dental mechanism connected with artificial teeth. In the bases and their "clasps" for attaching and securing them to the teeth remaining in the mouth, are comprised gold, copper, and silver—and in the solders used for uniting them the reprehensible addition of *zinc* is made. Here we have constructed an imperfect but active electro-galvanic battery, which, by the aid of gastric and buccal acids, under certain functional derangement of the organs of digestion, &c., eliminated into the mouth, a continuous electro-galvanic action is produced upon the teeth to which the plates are in contact. In one class, atrophy of the teeth is produced, and in others, hypertrophy and decay. In the first, the substance of the teeth is rapidly softened and are rendered exquisitely painful, caused by the galvanic action irritating the intro-dental nerves, in many instances causing the removal of the apices of the fangs by the dental absorbents. This activity of the metals will be best observed in those classes of teeth, of cartilaginous, lime, and other poorly developed teeth found in constitutions of the strumous, scrofulous, anemic and cachectic diathesis, or "ill habit of body."

In those of "iron constitutions," notwithstanding whose solid, dense, perfect organization of their teeth, seen only with well developed bone and

vigorous muscle, under gastric acid or abnormal condition of the fluids of the mouth, we find that gold and other fillings do excite the intro-dental nerves, not only causing them to super-excite the dental absorbents to suck away the apices of the fangs, as in the poorer class, but, singularly enough, in other instances acting the reverse, by exciting a new secretion and deposit of bone *in* and upon the fangs, causing their enlargement or exostosis, often causing the periosteum to thicken, thereby pushing the teeth from their sockets until their necks and fangs are almost denuded of the covering gums. Where the electro-galvanic action of metallic teeth bases is brought into contact with these hard teeth, we find that the same tenderness is produced in the bone substance, and its softening forming cavities—more slowly to be sure—with the gradual decadence and death of the necks and fangs to their final destruction.

The metals and their alloyage specially prepared for filling teeth, are melted together, and united into one, and then beaten into the shape of foils and other forms. They thus possess a homogeneousness, as it were, while alloyed dental plates united together with solder containing Zinc present intensely the reverse. Hence the galvanic force of foils is much lessened, hence much more slow in action, in some instances almost to imperceptibility, but not the less sure. It is only in those fortunate persons—and there are such ones, whatever the peculiarity of constitutional diathesis—habit of body—may be, whose functions of body appear always to be in a general condition of equilibrium. They do not know gastric or acid irritation; the fluid of the mouth is always in an alkaline state of neutrality, and hence antiseptic in its nature, and where intermissions of sickness or debility for the time only produce decay in the teeth—it is in these we find that fillings will last for an indefinite period of their life-time. It is in these cases that we *hear* of people dying of old age who in their life time had never lost a tooth.

Page 396, Vol. 1, Number 10, DENTAL MISCELLANY, a member speaking before the American Dental Association at Detroit, says: "He thought that the appliances of to-day were (are) so good that every filling should be put in so thoroughly tight as to last a life-time." With equal cogency the examining doctor of a Life Insurance Company might with ludicrous force tell his professional brethren that a physician must preserve the lives of his patients as long as they lived.

While plugging gold into teeth with mechanical skill and with finished polish, is the goal of the modern dentist to build a reputation upon, with the individual boast that his mode of operating will render the

teeth indestructible ever after, may answer the purpose of securing fabulous fees, these boasts only tend to demonstrate that they are either disinclined, or are too ignorant, to give an educational or an individual thought to each case and its pathology, presenting itself, and its special indication for treatment. If this mere mechanical skill will have the effect of preserving the remaining portions of the perishable matter of decayed teeth ever after, what, in the first instance, causes them to disintegrate from their original sound condition? This question I have anticipated, and the answer is already presented. Twenty-five years ago Dr. Clark, of this city, observed in his practice, that pure tin foil answered in some teeth better than gold as a preservative material. The late Dr. Varney—than whom the profession never boasted of a more accomplished expert—his experience induced him to advocate the use of pure tin in place of gold for filling a large majority of teeth for their better conservation.

I doubt if any of the foils used by dentists are free from alloyage. The alloyage with gold is silver—with silver, copper—with tin, in its native condition, copper. Pure tin is not readily oxidizable by the fluids eliminated into the mouth. Silver, no matter how pure, corrodes rapidly; with mercury, lead. The most oxidizable metal is always electro-positive in relation to the least oxidizable metal, which is negative, and the more opposite the metals in these respects, the greater is the electro-galvanic action produced. Metals placed in the following order, each will become positive by the contact of that which precedes it, and negative by that which follows, and the greatest effect will result from the contact of the most distant metals; to wit: Platinum, gold, silver, tin, mercury, copper, lead, and zinc. In the fluids of the mouth, tin and mercury should precede silver. Of the metals, silver, copper, and zinc are most destructive to the vitality and integrity of the teeth.

I shall add little to the subject of amalgams. As a durable filling they can be used in cases where other metallic fillings cannot be applied. Their use has been on the increase for very many years, and where formerly only grains were sold, our most distinguished dental depots now monthly sell pounds of the best *American* prepared amalgams.

Opposition to their use is made by those only who seek to obtain fabulous fees for gold fillings, which cannot be obtained for these, and hence appropriate to themselves the title of "the best dentists." In the appropriate places I have used amalgams for forty years past. With the exception of the *cadmium* amalgam, introduced to the profession a

few years since by Dr. Evans, of Paris, which proved highly and speedily destructive to the teeth, I am free to say that in no instance has the profession at large ever discovered, above the electro-galvanic action of the other metals used for preserving the teeth, that any injury has been done by their presence. In this respect they have presented the same features, and while they have been the means of doing as much good, like the other metals, they have not possessed, nor do they possess, sufficient conservative force to preserve perishable "decayed teeth" forever, any more than is boasted of for gold.

If any further proof be wanting to confirm the correctness of this paper, it may be found in the recordings made in the several dental periodicals, of members attending Dental Conventions and local Dental Societies, who never tire of repeating and iterating and reiterating "that teeth OUGHT to be filled to last forever." Again, by the constant and persistent experiments and offering substitutes for gold, some of which are accepted. And if a logical, practical proof be required, it will be found in the family's annual bill of expenses, wherein dental "family practice" exhibits the melancholy fact that the teeth, like the health and everything else, even the last, the graves of our friends, "must be attended to," to be kept "in good order."

OUR LONDON LETTER.

London, October 5th, 1874.

After blowing the carbon from his sooty lungs, the London practitioner is once more getting into harness. The apparently teeming population of this indescribable city suddenly seems to double itself; the equinoxes blow for a few hours, the medical schools have their opening addresses and their equally interesting, and much more enjoyable opening dinners, and then we all know that October is here, and that we have run into the last quarter of the year. Talking of opening dinners, one of our leading general hospitals had its dinner in due course, and in the chair was the high priest of our profession on this side of the water, Mr. Tomes. There were about one hundred at dinner, and it was very gratifying to those of our specialty to see one of its leading and most esteemed members presiding over the meeting. Although the right to do so may be questionable, we all felt a shade brighter, if I may be pardoned the paradox, in the reflected glory of

our exalted brother. I hope your republican simplicity will not blame us for doing so. To-day we have been assisting at the opening of the winter season of the London School of Dental Surgery in Leicester Square. There was a gathering of about three hundred ladies and gentlemen. The chair was occupied by Mr. Savory, one of the examiners of the Royal College of Surgeons—a Fellow of the Royal Society, which I ought to tell you is the blue ribbon of the scientific world here. Beside him was Mr. De Morgan, another distinguished surgeon, also enjoying the proud distinction of F. R. S., and not far off was another gentleman bearing the same title, to whom I have already alluded in my letter—Mr. Tomes. On his right sat Dr. N. W. Kingsley, whose health, you will be glad to hear, is now quite restored, and on the Doctor's right sat Mrs. C. Tomes, with her mother and sister, Mrs. and Miss Cook, from Brooklyn. So you see we had the pleasure of some company from your side of the water, and felt not a little proud in being able to show them some signs of the progress we have been making lately, and one of the speakers paid a well merited compliment to the genius of Dr. Kingsley, which has done so much in binding together the mechanical and surgical branches of our profession, at a time when some have been seeking to turn them apart.

Some time ago I told you that a testimonial was on foot to Mr. Saunders. At this meeting it was announced that this gentleman had requested that the money collected, instead of being laid out in a bust, should be invested, and the interest devoted to a scholarship in Dental Surgery. Of course it will be called the Saunders Scholarship, and will no doubt be highly appreciated.

Mr. Savory delivered an eloquent address, and through the kindness of Mr. Oakley Coles, I am enabled to send you the slips, which I trust may be in time for your November issue.

I cannot conclude this letter without alluding to a subject which I dare say has passed from the minds of most of you now : that is, the obituary of the last month. We look upon the death of one of your number as one taken from among ourselves, and although we cannot always mourn a personal friend, we have often to grieve for one who has afforded us much useful professional information. One, however, who lately passed away, had made for himself here many warm friends, and although we do not convene a meeting to state that whereas we bow to the Divine Will—seeing we have no choice in the matter—we mourn his loss as that of a good and true man. May the Divine Will see fit to raise up many imitators in his wake, and so will we know that our

dear friend has not lived and labored in vain for the profession which he loved and strove so hard to elevate. The name of Dr. Thomas Hitchcock will remain amongst us ever associated with all that is honorable and admirable.

> "Long, long be the heart with such memories filled,
> Like the vase in which roses have once been distilled;
> You may crush, you may shatter the vase if you will,
> But the fragrance of roses will hang round it still."
>
> VAGRANT.

JOSEPH PRIESTLEY.*

By T. H. HUXLEY, LL. D., F.R.S.

From Macmillan's Magazine.

If the man to perpetuate whose memory we have this day raised a statue had been asked on what part of his busy life's work he set the highest value, he would undoubtedly have pointed to his voluminous contributions to theology. In season and out of season, he was the steadfast champion of that hypothesis respecting the Divine nature which is termed Unitarianism by its friends and Socinianism by its foes. Regardless of odds, he was ready to do battle with all comers in that cause; and, if no adversaries entered the lists, he would sally forth to seek them.

To this, his highest ideal of duty, Joseph Priestley sacrificed the vulgar prizes of life, which assuredly were within easy reach of a man of his singular energy and varied abilities. For this object he put aside, as of secondary importance, those scientific investigations which he loved so well, and in which he showed himself so competent to enlarge the boundaries of natural knowledge and to win fame. In this course, he not only cheerfully suffered obloquy from the bigoted and the unthinking, and came within sight of martyrdom, but bore with that which is much harder to be borne than all these—the unfeigned astonishment and hardly disguised contempt of a brilliant society, composed of men whose sympathy and esteem must have been most dear to him, and to whom it was simply incomprehensible that a philosopher should seriously occupy himself with any form of Christianity.

It appears to me that the man, who, setting before himself such an

* An Address delivered on the occasion of the presentation of a statue of Priestley to the town of Birmingham, August 1, 1874. With some additions.

ideal of life, acted up to it consistently, is worthy of the deepest respect, whatever opinion may be entertained as to the real value of the tenets which he so zealously propagated and defended.

But I am sure that I speak not only for myself, but for all this assemblage, when I say that our purpose to-day is to do honor, not to Priestley, the Unitarian divine, but to Priestley, the fearless defender of rational freedom in thought and in action; to Priestley, the philosophic thinker; to that Priestley who held a foremost place among "the swift runners who hand over the lamp of life,"* and transmit from one generation to another the fire kindled, in the childhood of the world, at the Promethean altar of Science.

The main incidents of Priestley's life are so well known that I need dwell upon them at no great length.

Born in 1733, at Fieldhead, near Leeds, and brought up among Calvinists of the straitest orthodoxy, the boy's striking natural ability led to his being devoted to the profession of a minister of religion; and, in 1752, he was sent to the Dissenting Academy at Daventry—an institution which authority left undisturbed, though its existence contravened the law. The teachers under whose instruction and influence the young man came, at Daventry, carried out to the letter the injunction to "try all things, hold fast that which is good," and encouraged the discussion of every imaginable proposition with complete freedom, the leading professors taking opposite sides; a discipline which, admirable as it may be from a purely scientific point of view, would seem to be calculated to make acute rather than sound divines. Priestley tells us, in his "Autobiography," that he generally found himself on the unorthodox side: and as he grew older, and his faculties attained their maturity, this native tendency toward heterodoxy grew with his growth and strengthened with his strength. He passed from Calvinism to Arianism; and finally, in middle life, landed in that very broad form of Unitarianism by which his craving after a credible and consistent theory of things was satisfied.

On leaving Daventry, Priestley became minister of a congregation, first at Needham Market and secondly at Nantwich; but whether on account of his heterodox opinions, or of the stuttering which impeded his expression of them in the pulpit, little success attended his efforts in this capacity. In 1761 a career much more suited to his abilities became opened to him. He was appointed "tutor in the languages" in the Dissenting Academy at Warrington, in which capacity, besides

*"Quasi cursores vitaï, lampada tradunt."—LUCRETIUS. "*De Rerum Nat.*," ii., 78

giving three courses of lectures, he taught Latin, Greek, French, and Italian, and read lectures on the Theory of Language and Universal Grammar, on Oratory, Philosophical Criticism, and the Civil Law. And it is interesting to observe that, as a teacher, he encouraged and cherished, in those whom he instructed, the freedom which he had enjoyed, in his own student days, at Daventry. One of his pupils tells us that—

"At the conclusion of his lecture, he always encouraged his students to express their sentiments relative to the subject of it, and to urge any objections to what he had delivered, without reserve. It pleased him when any one commenced such a conversation. In order to excite the freest discussion, he occasionally invited the students to drink tea with him, in order to canvass the subjects of his lectures. I do not recollect that he ever showed the least displeasure at the strongest objections that were made to what he delivered, but I distinctly remember the smile of approbation with which he usually received them; nor did he fail to point out, in a very encouraging manner, the ingenuity or force of any remarks that were made, when they merited these characters. His object, as well as Dr. Aikin's, was, to engage the students to examine and decide for themselves, uninfluenced by the sentiments of any other persons."*

It would be dificult to give a better description of a model teacher than that conveyed in these words.

From his earliest days, Priestley had shown a strong bent toward the study of Nature; and his brother Timothy tells us that the boy put spiders into bottles to see how long they would live in the same air—a curious anticipation of the investigations of his later years. At Nantwich, where he set up a school, Priestley informs us that he bought an air-pump, an electrical machine, and other instruments, in the use of which he instructed his scholars. But he does not seem to have devoted himself seriously to physical science until 1766, when he had the great good fortune to meet Benjamin Franklin, whose friendship he ever afterward enjoyed. Encouraged by Franklin, he wrote a "History of Electricity," which was published in 1767, and appears to have met with considerable success.

In the same year, Priestley left Warrington to become the minister of a congregation at Leeds; and here, happening to live next door to a public brewery, as he says—

"I at first amused myself with making experiments on the fixed air

*"Life and Correspondence of Dr Priestley." by J. T. Rutt, vol. i., p. 50.

which I found ready made in the process of fermentation. When I removed from that house I was under the necessity of making fixed air for myself; and, one experiment leading to another, as I have distinctly and faithfully noted in my various publications on the subject, I by degrees contrived a convenient apparatus for the purpose, but of the cheapest kind.

"When I began these experiments I knew very little of *chemistry*, and had, in a manner, no idea on the subject before I attended a course of chemical lectures, delivered in the Academy at Warrington, by Dr. Turner, of Liverpool. But I have often thought that, upon the whole, this circumstance was no disadvantage to me; as, in this situation, I was led to devise an apparatus and processes of my own, adapted to my peculiar views; whereas, if I had been previously accustomed to the usual chemical processes, I should not have so easily thought of any other, and, without new modes of operation, I should hardly have discovered any thing materially new."*

The first outcome of Priestley's chemical work, published in 1772, was of a very practical character. He discovered the way of impregnating water with an excess of "fixed air," or carbonic acid, and thereby producing what we now know as "soda-water"—a service to naturally, and still more to artificially, thirsty souls, which those, whose parched throats and hot heads are cooled by morning draughts of that beverage, cannot too gratefully acknowledge. In the same year Priestley communicated the extensive series of observations which his industry and ingenuity had accumulated, in the course of four years, to the Royal Society, under the title of "Observations on Different Kinds of Air"—a memoir which was justly regarded of so much merit and importance, that the Society at once conferred upon the author the highest distinction in their power, by awarding him the Copley Medal.

In 1771 a proposal was made to Priestley to accompany Captain Cook in his second voyage to the South Seas. He accepted it, and his congregation agreed to pay an assistant to supply his place during his absence. But the appointment lay in the hands of the Board of Longitude, of which certain clergymen were members; and whether these worthy ecclesiastics feared that Priestley's presence among the ship's company might expose his majesty's sloop Resolution to the fate which aforetime befell a certain ship that went from Joppa to Tarshish, or whether they were alarmed lest a Socinian should undermine that piety which, in the days of Commodore Trunnion, so strikingly characterized sailors, does

* "Autobiography," §§ 100, 101.

not appear; but, at any rate, they objected to Priestley, "on account of his religious principles," and appointed the two Forsters, whose "religious principles," if they had been known to these well-meaning but not far-sighted persons, would probably have surprised them.

In 1772 another proposal was made to Priestley. Lord Shelburne, desiring a "literary companion," had been brought into communication with Priestley by the good offices of a friend of both—Dr. Price—and offered him the nominal post of librarian, with a good house and appointments, and an annuity in case of the termination of the engagement. Priestley accepted the offer, and remained with Lord Shelburne for seven years, sometimes residing at Calne, sometimes traveling abroad with the earl.

Why the connection terminated has never been exactly known, but it is certain that Lord Shelburne behaved with the utmost consideration and kindness toward Priestley; that he fulfilled his engagements to the letter; and that, at a later period, he expressed a desire that he should return to his old footing in his house. Probably enough the politician, aspiring to the highest offices in the state, may have found the position of the protector of a man, who was being denounced all over the country as an infidel and an atheist, somewhat embarrassing. In fact, a passage in Priestley's "Autobiography," on the occasion of the publication of his "Disquisitions relating to Matter and Spirit," which took place in 1777, indicates pretty clearly the state of the case:

"(126.) It being probable that this publication would be unpopular, and might be the means of bringing odium on my patron, several attempts were made by his friends, though none by himself, to dissuade me from persisting in it. But being, as I thought, engaged in the cause of important truth, I proceeded without regard to any consequences, assuring them that this publication should not be injurious to his lordship."

It is not unreasonable to suppose that his lordship, as a keen, practical man of the world, did not derive much satisfaction from this assurance. The "evident marks of dissatisfaction," which Priestley says he first perceived in his patron in 1778, may well have arisen from the peer's not unnatural uneasiness as to what his domesticated but not tamed philosopher might write next, and what storm might thereby be brought down on his own head; and it speaks very highly for Lord Shelburne's delicacy, that, in the midst of such perplexities, he made not the least attempt to interfere with Priestley's freedom of action. In 1780, however, he intimated to Dr. Price that he should be glad to establish

Priestley on his Irish estates; the suggestion was interpreted as Lord Shelburne probably intended it should be, and Priestley left him, the annuity of £150 a year, which had been promised in view of such a contingency, being punctually paid.

After leaving Calne, Priestley spent some little time in London, and then, having settled in Birmingham, at the desire of his brother-in-law, he was soon invited to become the minister of a large congregation. This settlement Priestley considered at the time to be "the happiest event of his life." And well he might think so, for it gave him competence and leisure; placed him within reach of the best makers of apparatus of the day; made him a member of that remarkable "Lunar Society" at whose meetings he could exchange thoughts with such men as Watt, Wedgewood, Darwin, and Boulton; and threw open to him the pleasant house of the Galtons of Barr, where these men, and others of less note, formed a society of exceptional charm and intelligence.*

But these halcyon days were ended by a bitter storm. The French Revolution broke out. An electric shock ran through the nations; whatever there was of corrupt and retrograde, and, at the same time, a great deal of what there was of best and noblest, in European society, shuddered at the outburst of long-pent-up social fires. Men's feelings were excited in a way that we in this generation can hardly comprehend. Party wrath and virulence were expressed in a manner unparalleled, and it is to be hoped impossible, in our times; and Priestley and his friends were held up to public scorn, even in Parliament, as fomenters of sedition. A "Church-and-King" cry was raised against the Liberal Dissenters; and in Birmingham it was intensified and specially directed toward Priestley by a local controversy, in which he had engaged with his usual vigor. In 1791 the celebration of the second anniversary of the taking of the Bastile, by a public dinner, with which Priestley had nothing whatever to do, gave the signal to the loyal and pious mob, who, unchecked, and indeed to some extent encouraged, by those who were responsible for order, had the town at their mercy for three days. The

* *See* "The life of Mary Ann Schimmelpenninck." Mrs. Schimmelpenninck (*née* Galton) remembered Priestley very well, and her description of him is worth quotation: "A man of admirable simplicity, gentleness, and kindness of heart, united with great acuteness of intellect. I can never forget the impression produced on me by the serene expression of his countenance. He, indeed, seemed present with God by recollection, and with man by cheerfulness. I remember that, in the assembly of these distinguished men, among whom Mr. Boulton, by his noble manner, his fine countenance (which much resembled that of Louis XIV.), and princely munificence, stood preëminently as the great Mæcenas; even as a child I used to feel, when Dr. Priestley entered after him, that the glory of the one was terrestrial, that of the other, celestial; and utterly far as I am removed from a belief in the sufficienly of Dr. Priestley's theological creed, I cannot but here record this evidence of the eternal power of any portion of the truth held in its vitality."

chapels and houses of the leading Dissenters were wrecked, and Priestley and his family had to fly for their lives, leaving library, apparatus, papers, and all their possessions, a prey to the flames.

Priestley never returned to Birmingham. He bore the outrages and losses inflicted upon him with extreme patience and sweetness,* and betook himself to London. But even his scientific colleagues gave him a cold shoulder; and, though he was elected minister of a congregation at Hackney, he felt his position to be insecure, and finally determined on emigrating to the United States. He landed in America in 1794; lived quietly with his sons at Northumberland, in Pennsylvania, where his posterity still flourish; and, clear-headed and busy to the last, died February 6, 1804.

Such were the conditions under which Joseph Priestley did the work which lay before him, and then, as the Norse Sagas say, went out of the story. The work itself was of the most varied kind. No human interest was without its attraction for Priestley, and few men have ever had so many irons in the fire at once; but, though he may have burned his fingers a little, very few who have tried that operation have burned their fingers so little. He made admirable discoveries in science; his philosophical treatises are still well worth reading; his political works are full of insight and replete with the spirit of freedom; and, while all these sparks flew off from his anvil, the controversial hammer rained a hail of blows on orthodox priest and bishop. While thus engaged, the kindly, cheerful doctor felt no more wrath or uncharitableness toward his opponents than a smith does toward his iron. But if the iron could only speak!—and the priests and bishops took the point of view of the iron.

No doubt what Priestley's friends repeatedly urged upon him—that he would have escaped the heavier trials of his life and done more for the advancement of knowledge, if he had confined himself to his scientific pursuits and let his fellow-men go their way—was true. But it seems to have been Priestley's feeling that he was a man and a citizen before he was a philosopher, and that the duties of the two former positions are at least as imperative as those of the latter. Moreover, there are men (and I think Priestley was one of them) to whom the satisfaction of throwing down a triumphant fallacy is as great as that which attends the discovery of a new truth; who feel better satisfied with the government of the world, when they have been helping Providence by

*Even Mrs. Priestley, who might be forgiven for regarding the destroyers of her household gods with some asperity, contents herself, in writing to Mrs. Barbauld, with the sarcasm that the Birmingham people "will scarcely find so many respectable characters a second time to make a bonfire of."

knocking an imposture on the head ; and who care even more for freedom of thought than for mere advance of knowledge. These men are the Carnots who organize victory for truth, and they are, at least, as important as the Generals who visibly fight their battles in the field.

Priestley's reputation as a man of science rests upon his numerous and important contributions to the chemistry of gaseous bodies ; and to form a just estimate of the value of his work—of the extent to which it advanced the knowledge of fact and the development of sound theoretical views—we must reflect what chemistry was in the first half of the eighteenth century.

The vast science which now passes under that name had no existence. Air, water, and fire, were still counted among the elemental bodies ; and though Van Helmont, a century before, had distinguished different kinds of air as *gas ventosum* and *gas sylvestre*, and Boyle and Hales had experimentally defined the physical properties of air, and discriminated some of the various kinds of aëriform bodies, no one suspected the existence of the numerous totally distinct gaseous elements which are now known, or dreamed that the air we breathe and the water we drink are compounds of gaseous elements.

But, in 1754, a young Scotch physician, Dr. Black, made the first clearing in this tangled backwood of knowledge. And it gives one a wonderful impression of the juvenility of scientific chemistry to think that Lord Brougham, whom so many of us recollect, attended Black's lectures when he was a student in Edinburgh. Black's researches gave the world the novel and startling conception of a gas that was a permanently elastic fluid like air, but that differed from common air in being much heavier, very poisonous, and in having the properties of an acid, capable of neutralizing the strongest alkalies ; and it took the world some time to become accustomed to the notion.

A dozen years later, one of the most sagacious and accurate investigators who has adorned this or any other country, Henry Cavendish, published a memoir in the "Philosophical Transactions," in which he deals not only with the "fixed air" (now called carbonic acid or carbonic anhydride) of Black, but with "inflammable air," or what we now term hydrogen.

By the rigorous application of weight and measure to all his processes, Cavendish implied the belief subsequently formulated by Lavoisier, that, in chemical processes, matter is neither created nor destroyed, and indicated the path along which all future explorers must travel. Nor did he himself halt until this path led him, in 1784, to the brilliant and

fundamental discovery that water is composed of two gases united in fixed and constant proportions.

It is a trying ordeal for any man to be compared with Black and Cavendish, and Priestley cannot be said to stand on their level. Nevertheless, his achievements are not only great in themselves, but truly wonderful, if we consider the disadvantages under which he labored. Without the careful scientific training of Black, without the leisure and appliances secured by the wealth of Cavendish, he scaled the walls of science as so many Englishmen have done before and since his day ; and, trusting to mother-wit to supply the place of training, and to ingenuity to create apparatus out of washing-tubs, he discovered more new gases than all his predecessors put together had done. He laid the foundation of gas analysis ; he discovered the complementary actions of animal and vegetable life upon the constituents of the atmosphere ; and, finally, he crowned his work, this day one hundred years ago, by the discovery of that "pure dephlogisticated air" to which the French chemists subsequently gave the name of oxygen. Its importance, as the constituent of the atmosphere which disappears in the processes of respiration and combustion, and is restored by green plants growing in sunshine, was proved somewhat later. For these brilliant discoveries the Royal Society elected Priestley a Fellow and gave him their medal, while the Academies of Paris and St. Petersburgh conferred their membership upon him. Edinburgh had made him an honorary doctor of laws at an early period of his career ; but, I need hardly add that a man of Priestley's opinions received no recognition from the universities of his own country.

That Priestley's contributions to the knowledge of chemical fact were of the greatest importance, and that they richly deserve all the praise that has been awarded to them, is unquestionable ; but it must, at the same time, be admitted that he had no comprehension of the deeper significance of his work ; and, so far from contributing anything to the theory of the facts which he discovered, or assisting in their rational explanation, his influence to the end of his life was warmly exerted in favor of error. From first to last, he was a stiff adherent of the phlogiston doctrine which was prevalent when his studies commenced ; and, by a curious irony of fate, the man who, by the discovery of what he called "dephlogisticated air," furnished the essential datum for the true theory of combustion, of respiration, and of the composition of water, to the end of his days fought against the inevitable corollaries from his own labors. His last scientific work, published in 1800, bears the title,

"The Doctrine of Phlogiston established, and that of the Composition of Water refuted."

When Priestley commenced his studies, the current belief was, that atmospheric air, freed from accidental impurities, is a simple elementary substance, indestructible and unalterable, as water was supposed to be.

When a combustible burned, or when an animal breathed in air, it was supposed that a substance, "phlogiston," the matter of heat and light, passed from the burning or breathing body into it, and destroyed its powers of supporting life and combustion. Thus, air contained in a vessel in which a lighted candle had gone out, or a living animal had breathed until it could breathe no longer, was called "phlogisticated." The same result was supposed to be brought about by the addition of what Priestley called "nitrous gas" to common air.

In the course of his researches, Priestley found that the quantity of common air which can thus become "phlogisticated" amounts to about one-fifth the volume of the whole quantity submitted to experiment. Hence it appeared that common air consists, to the extent of four-fifths of this volume, of air which is already "phlogisticated;" while the other fifth is free from phlogiston, or "dephlogisticated." On the other hand, Priestley found that air "phlogisticated" by combustion or respiration could be "dephlogisticated," or have the properties of pure common air restored to it, by the action of green plants in sunshine. The question, therefore, would naturally arise—as common air can be wholly phlogisticated by combustion, and converted into a substance which will no longer support combustion, is it possible to get air that shall be less phlogisticated than common air, and consequently support combustion better than common air does?

Now, Priestley says that, in 1774, the possibility of obtaining air less phlogisticated than common air had not occurred to him.* But, in pursuing his experiments on the evolution of air from various bodies by means of heat, it happened that, on the 1st of August, 1774, he threw the heat of the sun, by means of a large burning-glass which he had recently obtained, upon a substance which was then called *mercurius calcinatus per se*, and which is commonly known as red precipitate:

"I presently found that, by means of this lens, air was expelled from it very readily. Having got about three or four times as much as the bulk of my materials, I admitted water to it, and found that it was not imbibed by it. But, what surprised me more than I can well express, was, that a candle burned in this air with a remarkably vigorous flame,

*"Experiments and Observations on Different Kinds of Air," vol. ii., p. 31.

very much like that enlarged flame with which a candle burns in nitrous air, exposed to iron or lime of sulphur; but, as I had got nothing like this remarkable appearance from any kind of air besides this particular modification of nitrous air, and I knew no nitrous acid was used in the preparation of *mercurius calcinatus*, I was utterly at a loss how to account for it.

"In this case also, though I did not give sufficient attention to the circumstance at that time, the flame of the candle, besides being larger, burned with more splendor and heat than in that species of nitrous air; and a piece of red-hot wood sparkled in it, exactly like paper dipped in a solution of nitre, and it consumed very fast—an experiment which I had never thought of trying with nitrous air."*

Priestley obtained the same sort of air from red lead, but, as he says himself, he remained in ignorance of the properties of this new kind of air for seven months, or until March, 1775,† when he found that the new air behaved with "nitrous gas" in the same way as the dephlogisticated part of common air does; but that, instead of being diminished to four-fifths, it almost completely vanished, and therefore showed itself to be "between five and six times as good as the best common air I have ever met with."‡ As this new air thus appeared to be completely free from phlogiston, Priestley called it "dephlogisticated air."

What was the nature of this air? Priestley found that the same kind of air was to be obtained by moistening with the spirit of nitre (which he terms nitrous acid) any kind of earth that is free from phlogiston, and applying heat; and consequently he says, "There remained no doubt on my mind but that the atmospherical air, or the thing that we breathe, consists of the nitrous acid and earth, with so much phlogiston as is necessary to its elasticity, and likewise so much more as is required to bring it from its state of perfect purity to the mean condition in which we find it."§

Priestley's view, in fact, is that atmospheric air is a kind of saltpetre, in which the potash is replaced by some unknown earth. And in speculating on the manner in which saltpetre is formed, he enunciates the hypothesis, "that nitre is formed by a real *decomposition of the air itself*, the *bases* that are presented to it having, in such circumstances, a nearer affinity with the spirit of nitre than that kind of earth with which it is united in the atmosphere."‖

It would have been hard for the most ingenious person to have

*"Experiments and Observations on Different Kinds of Air," vol. ii., pp. 34, 35.
†Ibid., b. 40. ‡Ibid., p. 48. §Ibid., p. 55.
‖Ibid., p. 60. The italics are Priestley's own.

wandered farther from the truth than Priestley does in this hypothesis of his—and though Lavoisier undoubtedly treated Priestley very ill, and pretended to have discovered dephlogisticated air, or oxygen, as he called it, independently, we can almost forgive him when we reflect how different were the ideas which the great French chemist attached to the body which Priestley discovered.

They are like two navigators, of whom the first sees a new country, but takes clouds for mountains and mirage for lowlands; while the second determines its length and breadth, and lays down on a chart its exact place, so that it, thenceforth, serves as a guide to his successors, and becomes a secure outpost whence new explorations may be pushed.

Nevertheless, as Priestley himself somewhere remarks, the first object of physical science is to ascertain facts, and the service which he rendered to chemistry, by the definite establishment of a large number of new and fundamentally important facts, is such as to entitle him to a very high place among the fathers of chemical science.

It is difficult to say whether Priestley's philosophical, political, or theological views were most responsible for the bitter hatred which was borne to him by a large body of his countrymen,* and which found its expression in the malignant insinuations in which Burke, to his everlasting shame, indulged in the House of Commons.

Without containing much that will be new to the readers of Hobbes, Spinoza, Collins, Hume, and Hartley, and, indeed, while making no pretensions to originality, Priestley's "Disquisitions relating to Matter and Spirit," and his "Doctrine of Philosophical Necessity Illustrated," are among the most powerful, clear, and unflinching expositions of materialism and necessarianism which exist in the English language, and are still well worth reading.

Priestley denied the freedom of the will in the sense of its self-determination; he denied the existence of a soul distinct from the body; and, as a natural consequence, he denied the natural immortality of man.

In relation to these matters, English opinion, a century ago, was very much what it is now.

*"In all the newspapers and most of the periodical publications I was represented as an unbeliever in Revelation, and no better than an atheist."—*Autobiography*, Hutt, vol. i., p. 124. "On the walls of houses, etc., and especially where I usually went, were to be seen, in large characters, 'MADAN FOREVER; DAMN PRIESTLEY; NO PRESBYTERIANISM; DAMN THE PRESBYTERIANS,' etc., etc.; and, at one time, I was followed by a number of boys, who left their play, repeating what they had seen on the walls, and shouting out, '*Damn Priestley; damn hin, damn him, forever, forever,' etc., etc.* This was no doubt a lesson which they had been taught by their parents, and what they, I fear, had learned from their superiors."—*Appeal to the Public on the Subject of the Riots at Birmingham.*

A man may be a necessarian without incurring graver reproach than that implied in being called a gloomy fanatic, necessarianism, though very shocking, having a note of Calvinistic orthodoxy ; but, if a man is a materialist ; or, if good authorities say he is and must be so, in spite of his assertion to the contrary ; or, if he acknowledge himself unable to see good reasons for believing in the natural immortality of man, respectable folks look upon him as an unsafe neighbor of a cash-box, as an actual or potential sensualist, the more virtuous in outward seeming, the more certainly loaded with secret "grave personal sins."

Nevertheless, it is as certain as anything can be, that Joseph Priestley was no gloomy fanatic, but as cheerful and kindly a soul as ever breathed, the idol of children ; a man who was hated only by those who did not know him, and who charmed away the bitterest prejudices in personal intercourse : a man who never lost a friend, and the best testimony to whose worth is the generous and tender warmth with which his many friends vied with one another in rendering him substantial help, in all the crises of his career.

The unspotted purity of Priestley's life, the strictness of his performance of every duty, his transparent sincerity, the unostentatious and deep-seated piety which breathes through all his correspondence, are in themselves a sufficient refutation of the hypothesis, invented by bigots to cover uncharitableness, that such opinions as his must arise from moral defects. And his statue will do as good service as the brazen image that was set upon a pole before the Israelites, if those who have been bitten by the fiery serpents of sectarian hatred, which still haunt this wilderness of a world, are made whole by looking upon the image of a heretic, who was yet a saint.

Though Priestley did not believe in the natural immortality of man, he held with an almost naïve realism, that man would be raised from the dead by a direct exertion of the power of God, and thenceforward be immortal. And it may be as well for those who may be shocked by this doctrine to know that views, substantially identical with Priestley's, have been advocated, since his time, by two prelates of the Anglican Church : by Dr. Whately, Archbishop of Dublin, in his well-known "Essays ;" * and by Dr. Courtenay, Bishop of Kingston in Jamaica, the first edition of whose remarkable book, "On the Future States," dedicated to Archbishop Whately, was published in 1843, and the second in 1857. According to Bishop Courtenay :

*First Series. "On Some of the Peculiarities of the Christian Religion." Essay I. Revelation of a Future State.

"The death of the body will cause a cessation of all the activity of the mind by way of natural consequence; to continue forever, UNLESS the Creator should interfere."

And again:

"The natural end of human existence is the 'first death,' the dreamless slumber of the grave, wherein man lies spell-bound, soul and body, under the dominion of sin and death—that whatever modes of conscious existence, whatever future states of 'life' or of 'torment' beyond Hades are reserved for man, are results of our blessed Lord's victory over sin and death; that the resurrection of the dead must be preliminary to their entrance into either of the future states, and that the nature and even existence of these states, and even the mere fact that there is a futurity of consciousness, can be known *only* through God's revelation of himself in the Person and the Gospel of his Son," p 389.

And now hear Priestley:

"Man, according to this system" (of materialism), "is no more than we now see of him. His being commences at the time of his conception, or perhaps at an earlier period. The corporeal and mental faculties, in being in the same substance, grow, ripen, and decay together; and whenever the system is dissolved it continues in a state of dissolution till it shall please that Almighty Being who called it into existence to restore it to life again."—*Matter and Spirit*, p. 49.

And again:

"The doctrine of the Scripture is, that God made man of the dust of the ground, and, by simply animating this organized matter, made man that living percipient and intelligent being that he is. According to Revelation, *death* is a state of rest and insensibility, and our only, though sure, hope of a future life is founded on the doctrine of the resurrection of the whole man at some distant period; this assurance being sufficiently confirmed to us, both by the evident tokens of a Divine commission attending the persons who delivered the doctrine, and especially by the actual resurrection of Jesus Christ, which is more authentically attested than any other fact in history."—*Ibid.*, p. 247.

We all know that "a saint in crape is twice a saint in lawn;" but it is not yet admitted that the views which are consistent with such saintliness in lawn become diabolical when held by a mere Dissenter.*

*Not only is Priestley at one with Bishop Courtenay in this matter, but with Hartley and Bonnet, both of them stout champions of Christianity. Moreover, Archbishop Whately's essay is little better than an expansion of the first paragraph of Hume's famous essay on the Immortality of the Soul: "By the mere light of reason it seems difficult to prove the immortality of the soul; the arguments for it are commonly derived either from metaphysical topics, or moral, or physical. But it is in

I am not here either to defend or to attack Priestley's philosophical views, and I cannot say that I am personally disposed to attach much value to episcopal authority in philosophical questions ; but it seems right to call attention to the fact that those of Priestley's opinions which have brought most odium upon him have been openly promulgated, without challenge, by persons occupying the highest positions in the state Church.

I must confess that what interests me most about Priestley's materialism is, the evidence that he saw dimly the seed of destruction which such materialism carries within its own bosom. In the course of his reading for his "History of Discoveries relating to Vision, Light, and Colors," he had come upon the speculations of Boscovisch and Michell, and had been led to admit the sufficiently obvious truth that our knowledge of matter is a knowledge of its properties ; and that of its substance —if it have a substance—we know nothing. And this led to the further admission that, so far as we can know, there may be no difference between the substance of matter and the substance of spirit ("Disquisitions," p. 16). A step further would have shown Priestley that his materialism was, in substance, very little different from the idealism of his contemporary, the Bishop of Cloyne.

As Priestley's philosophy is mainly a clear statement of the views of the deeper thinkers of his day, so are his political conceptions based upon those of Locke. Locke's aphorism, that "the end of government is the good of mankind, " is thus expanded by Priestley :

"It must necessarily be understood, therefore, whether it be expressed or not, that all people live in society for their mutual advantage ; so that the good and happiness of the members, that is, of the majority of the members, of any state, is the great standard by which everything relating to that state must finally be determined."*

The little sentence here interpolated, "that is, of the majority of the members of any state, "appears to be that passage which suggested to Bentham, according to his own acknowledgment, the famous "greatest happiness" formula, which, by substituting "happiness, " for "good," has converted a noble into an ignoble principle. But I do not call to mind that there is any utterance in Locke quite so outspoken as the following passage in the "Essay on the First Principles of Govern-

reality the Gospel, and the Gospel alone, that has brought *life and immortality to light.*" It is impossible to imagine that a man of Whately's tastes and acquirements had not read Hume or Hartley, though he refers to neither.

* "Essay on the First Principles of Government," second edition, 1771, p. 13.

ment." After laying down, as "a fundamental maxim in all governments," the proposition that "kings, senators, and nobles," are "the servants of the public," Priestley goes on to say :

"But in the largest states, if the abuses of the government should at any time be great and manifest ; if the servants of the people, forgetting their masters and their masters' interest, should pursue a separate one of their own ; if, instead of considering that they are made for the people, they should consider the people as made for them ; if the oppressions and violation of right should be great, flagrant, and universally resented ; if the tyrannical governors should have no friends but a few sycophants, who had long preyed upon the vitals of their fellow-citizens, and who might be expected to desert a government whenever their interests should be detached from it ; if, in consequence of these circumstances, it should become manifest that the risk which would be run in attempting a revolution would be trifling, and the evils which might be apprehended from it were far less than those which were actually suffered, and which were daily increasing ; in the name of God, I ask, what principles are those which ought to restrain an injured and insulted people from asserting their natural rights, and from changing, or even punishing their governors—that is, their servants—who had abused their trust, or from altering the whole form of their government, if it appeared to be of a structure so liable to abuse ?"

As a Dissenter, subject to the operation of the Corporation and Test Acts, and as a Unitarian, excluded from the benefit of the Toleration Act, it is not surprising to find that Priestley had very definite opinions about ecclesiastical establishments ; the only wonder is that these opinions were so moderate as the following passages show them to have been :

"Ecclesiastical authority may have been necessary in the infant state of society, and, for the same reason, it may perhaps continue to be, in some degree, necessary as long as society is imperfect ; and therefore may not be entirely abolished till civil governments have arrived at a much greater degree of perfection. If, therefore, I were asked whether I should approve of the immediate dissolution of all the ecclesiastical establishments in Europe, I should answer, No. . . . Let experiment be first made of *alterations*, or, which is the same thing, of *better establishments* than the present. Let them be reformed in many essential articles, and then not thrown aside entirely till it be found by experience that no good can be made of them."

Priestley goes on to suggest four such reforms of a capital nature :

"1. Let the Articles of Faith to be subscribed by candidates for the ministry be greatly reduced. In the formulary of the Church of England might not thirty-eight out of the thirty-nine be very well spared? It is a reproach to any Christian establishment if every man cannot claim the benefit of it who can say that he believes in the religion of Jesus Christ as it is set forth in the New Testament. You say the terms are so general that even deists would quibble and insinuate themselves. I answer that all the articles which are subscribed at present by no means exclude deists who will prevaricate; and upon this scheme you would at least exclude fewer honest men."*

The second reform suggested is the equalization, in proportion to work done, of the stipends of the clergy; the third, the exclusion of the bishops from Parliament; and the fourth, complete toleration, so that every man may enjoy the rights of a citizen, and be qualified to serve his country, whether he belong to the Established Church or not.

Opinions such as those I have quoted, respecting the duties and the responsibilities of governors, are the commonplaces of modern Liberalism; and Priestley's views on ecclesiastical establishments would, I fear, meet with but a cool reception, as altogether too conservative, from a large proportion of the lineal descendants of the people who taught their children to cry "Damn Priestley," and, with that love for the practical application of science which is the source of the greatness of Birmingham, tried to set fire to the doctor's house with sparks from his own electrical machine, thereby giving the man, they called an incendiary and raiser of sedition against Church and king, an appropriately experimental illustration of the nature of arson and riot.

If I have succeeded in putting before you the main features of Priestley's work, its value will become apparent when we compare the condition of the English nation, as we knew it, with its present state.

The fact that France has been for eighty-five years trying, without much success, to right herself after the great storm of the Revolution, is not unfrequently cited among us as an indication of some inherent incapacity for self-government among the French people. I think, however, that Englishmen who argue thus forget that, from the meeting of the Long Parliament in 1640, to the last Stuart rebellion in 1745, is a hundred and five years, and that, in the middle of the last century, we had but just freed ourselves from our Bourbons and all that they represented. The corruption of our state was as bad as that of the Second Empire. Bribery was the instrument of government.

* "Utility of Establishments," in "Essay on First Principles of Government," p. 198, 1771.

and peculation its reward. Four-fifths of the seats in the House of Commons were more or less openly dealt with as property. A minister had to consider the state of the vote market, and the sovereign secured a sufficiency of "king's friends," by payments allotted with retail, rather than royal, sagacity,

Barefaced and brutal immorality and intemperance pervaded the land, from the highest to the lowest classes of society. The Established Church was torpid, so far as it was not a scandal ; but those who dissented from it came within the meshes of the Act of Uniformity, the Test Act, and the Corporation Act. By law, such a man as Priestley, being a Unitarian, could neither teach nor preach, and was liable to ruinous fines and long imprisonment.* In those days, the guns that were pointed by the Church against the Dissenters were shotted. The law was a cesspool of iniquity and cruelty. Adam Smith was a new prophet whom few regarded, and commerce was hampered by idiotic impediments, and ruined by still more absurd help, on the part of government.

Birmingham, though already the centre of a considerable industry, was a mere village as compared with its present extent. People who traveled went about armed, by reason of the abundance of highwaymen, and the paucity and inefficiency of the police. Stage-coaches had not reached Birmingham, and it took three days to get to London. Even canals were a recent and much-opposed invention.

Newton had laid the foundation of a mechanical conception of the physical universe ; Hartley, putting a modern face upon ancient materialism, had extended that mechanical conception to pyschology ; Linnæus and Haller were beginning to introduce method and order into the chaotic accumulation of biological facts. But those parts of physical science which deal with heat, electricity, and magnetism, and, above all, chemistry, in the modern sense, can hardly be said to have had an existence. No one knew that two of the old elemental bodies, air and water, are compounds, and that a third, fire, is not a substance, but a motion. The great industries that have grown out of the applications of modern scientific discoveries had no existence, and the man, who should have foretold their coming into being in the days of his son, would have been regarded as a mad enthusiast.

In common with many other excellent persons, Priestley believed that man is capable of reaching, and will eventually attain, perfection. If the temperature of space presented no obstacle, I should be glad to

*In 1732 Doddridge was cited for teaching without the bishop's leave, at Northampton.

entertain the same idea; but, judging from the past progress of our species, I am afraid that the globe will have cooled down so far before the advent of this natural millennium, that we shall be, at best, perfected Esquimaux. For all practical purposes, however, it is enough that man may visibly improve his condition in the course of a century or so. And, if the picture of the state of things in Priestley's time, which I have just drawn, have any pretence to accuracy, I think it must be admitted that there has been a considerable change for the better.

I need not advert to the well-worn topic of material advancement, in a place in which the very stones testify to that progress—in the town of Watt and of Boulton. I will only remark, in passing, that material advancement has its share in moral and intellectual progress. Becky Sharpe's acute remark, that it is not difficult to be virtuous on ten thousand a year, has its application to nations; and it is futile to expect a hungry and squalid population to be anything but violent and gross. But as regards other than material welfare, although perfection is not yet in sight—even from the mast-head—it is surely true that things are much better than they were.

Take the upper and middle classes as a whole, and it may be said that open immorality and gross intemperance have vanished. Four and six bottle men are as extinct as the dodo. Women do not gamble, and talk modeled upon Dean Swift's "Art of Polite Conversation" would be tolerated in no decent kitchen.

Members of the legislature are not to be bought, and constituents are awakening to the fact that votes must not be sold—even for such trifles as rabbits and tea and cake. Political power has passed into the hands of the masses of the people. Those whom Priestley calls their servants have recognized their position, and have requested the master to be so good as to go to school and fit himself for the administration of his property. No civil disability attaches to any one on theological grounds, and the highest offices of the state are open to papist, Jew, or secularist.

Whatever men's opinions as to the policy of Establishment, no one can hesitate to admit that the clergy of the Church are men of pure life and conversation, zealous in the discharge of their duties, and, at present, apparently, more bent on prosecuting one another than on meddling with Dissenters. Theology itself has broadened so much that Anglican divines put forward doctrines more liberal than those of Priestley; and, in our state-supported churches, one listener may hear a sermon to which Bossuet might have given his approbation, while

another may hear a discourse in which Socrates would find nothing new.

But, great as these changes may be, they sink into insignificance beside the progress of physical science, whether we consider the improvement of methods of investigation, or the increase in bulk of solid knowledge. Consider that the labors of Laplace, of Young, of Davy, and of Faraday; of Cuvier, of Lamarck, and of Robert Brown; of Von Baer, and of Schwann; of Smith and of Hutton, have all been carried on since Priestley discovered oxygen; and consider that they are now things of the past, concealed by the industry of those who have built upon them, as the first founders of a coral-reef are hidden beneath the life's work of their successors; consider that the methods of physical science are slowly spreading into all investigations, and that proofs, as valid as those required by her canons of investigation, are being demanded of all doctrines which ask for men's assent—and you will have a faint image of the astounding difference in this respect between the nineteenth century and the eighteenth.

If we ask what is the deeper meaning of all these vast changes, I think there can be but one reply. They mean that Reason has asserted and exercised her primacy over all provinces of human activity: that ecclesiastical authority has been relegated to its proper place; that the good of the governed has been finally recognized as the end of government, and the complete responsibility of governors to the people as its means; and that the dependence of natural phenomena in general, on the laws of action of what we call matter, has become an axiom.

But it was to bring these things about, and to enforce the recognition of these truths, that Joseph Priestley labored. If the nineteenth century is other and better than the eighteenth, it is to him and to such men as he that we owe the change. If the twentieth century is to be better than the nineteenth, it will be because there are among us men who walk in Priestley's footsteps.

Such men are not those whom their own generation delights to honor: such men, in fact, rarely trouble themselves about honor, but ask, in another spirit than Falstaff's, "What is honor? Who hath it? He that died o' Wednesday." But whether Priestley's lot be theirs, and a future generation, in justice and in gratitude, set up their statues; or whether their names and fame are blotted out from remembrance, their work will live as long as time endures. To all eternity, the sum of truth and right will have been increased by their means; to all eternity, falsehood and injustice will be the weaker because they have lived.

"PRESERVING THE TEETH."

I am a young member of the dental profession in this city, and am a graduate of a respectable dental college ; I have availed myself of the numerous advantages which a large city affords for acquiring information in matters pertaining to my profession, and though a young man, I trust I am possessed of sufficient knowledge of the duties required of me, and of the skill in executing them, which permits me to accept my fees with the consciousness of having honestly and honorably earned them.

These particulars concerning myself are of interest only in so far as they apply to a large class of young practitioners, who, like myself, are desirous of availing themselves of the knowledge possessed by the older and more experienced members of our profession, and who are anxiously looking towards them for encouragement and support, in preparing themselves to fill useful and honorable positions, in their chosen pursuit. That the older practitioners do not meet our just expectations in this respect, can, I think, be very easily shown. I wish more particularly to address myself to certain of our teachers and writers, who, in one sentence, speak of their profession as worthy the highest emulation, and in another assert that it is neither a science, an art, or a profession.

I have just seen an article entitled, "Preserving the Teeth," read before the State Dental Society, and published in the November issue of the MISCELLANY, which affords an example of this. I agree with the writer on the importance of cleanliness of the teeth, as a preservative measure, and recognize his earnestness in advocating it; but in doing so, he has made several statements, which, if true, not only lowers the dignity of the profession, in my estimation, but also my self-respect, as a member of it.

I do not believe that "Dentists, as a class, are looked upon as being a little erratic, and inclined to soar." A few of our writers will use extravagant illustrations, which, in relation to their subject, will not bear the examination of common sense, and whose style of writing and speaking is condemned by good taste, as unnatural, inconsistent, and very degrading to them as scientific men ; but that they are numerous enough to stamp the entire profession as "erratic, and inclined to soar," I am loth to believe. Perhaps the writer had in mind those "inclined to soar," when he speaks of "the more kiting kind of dentists." Neither is he "so entirely alone in the novelty and simplicity

of his subject" as "may seem" from the quotation made from a popular writer, as I will show further on. Again he says, "The people seem to know what our business *is*, but they really do not know what it ought to be," and he gives as the "conception" of our calling by the people who "seem to know what our business *is*," "that we are tooth-pullers;" dental mechanics; artisans; and a very few, after much argument, consent, unwillingly, to rank us as "artists." But he "asserts, without fear of successful contradiction, that nobody considers ours necessarily a learned profession." Perhaps no better evidence can be adduced of the strength of our claim as a profession, than that it has withstood for so many years, such ill-advised attacks as the above. On the opposite page he says, "We must confess that at present our highest conception of the mission of Dentistry is to scale off salivary calculus; to dig out little holes, and fill them up again; to provide artificial substitutes, etc." How briefly and elegantly expressed is this definition of Dentistry! Still he would have us believe in, and teach "something higher," though he thinks the generation may pass away before it is to any considerable degree reduced to practice. This is discouraging to "the generation." He states that "Dentists are not allowed a professional fee," notwithstanding the fact that on the opposite page he "finds some verification in the price lists on cards now in circulation," of the statement "that within the last half dozen years there were not three dentists in the city of New York who knew how to clean a set of teeth;" a charge so extravagant and sweeping as to cast suspicion upon the reliability of any statement from this source.

If patients "almost without exception" "consider it to be an extortion unless it (the fee) bears some reasonable relation to the cost of material used," it is because they have a very poor idea of the value of their dentist's time, and this is the latter's fault entirely. In the "sample case" mentioned, the "bill of two dollars" was not sent in till "months after"—a lapse of time sufficient to delude the patient into the idea that no charge would be made. He calls attention to "our vast array of instruments, apparatus, appliances, materials all for repair," asks "what for prevention?" and answers, "A few grains of phosphate of lime during gestation, and perhaps the occasional subsequent use of aqua calcis." If this is our only means of prevention, its adoption will necessitate questioning our married lady patients upon a very delicate subject, though one presenting a very interesting condition for their consideration.

We are asked to "look over our books; search them carefully for the teaching of the golden rule of Prevention." "Where do you find it?" Echo answers, "Where?" A very unsatisfactory answer indeed. Hippocrates, who wrote 350 years before Christ, refers to cleaning the teeth, and gives formula for dentifrices. Hunter, whose observations were made before 1755, and published in 1778; Fox, 1803; Koecker, 1826; Harris, 1839; Parmley, 1841; Goddard, 1844; Desirabode, (translations) 1847. These men taught that cleaning teeth was the only preservative measure. Our periodical literature contains articles upon this subject, contributed by some of the best minds in the profession. Arthur, in his late work, insists upon perfect cleanliness of the teeth in conjunction with his system of separation. A reference to complete files of our Dental Journals since the time of their first publication, will prove that the importance of this measure has never been lost sight of by our writers. If at present we do not realize its necessity as a preventive and preservative measure, it is not because the subject has been neglected by our writers and authors.

There are nearly twelve pages of compact printed matter in this article upon "Preserving the Teeth," after a careful perusal of which, I fail to learn anything in advance of what was written thirty years ago: yet there has been great advancement made in the mode of cleaning the teeth, and in the appliances and materials used.

In this paper upon "Preserving the Teeth," mention is made of the Society for the Prevention of Cruelty to Animals; "a society for the repair of broken limbs" accidents, their conditions and circumstances: "the lawyer and his client;" Roman Emperors; Aurelian upon the distant Danube; Allemanni and "the imperial city." He compares "the mission of the profession, to saving the soul, rather than praying or buying it out of purgatory." He speaks of a "celebrated theologian;" "this Gospel of Prevention;" a "new departure;" a "new Gospel;" divines; preaching and sinners. Comment is unnecessary.

And now I wish to say, most earnestly, that these remarks have not been made in a spirit of malignant criticism; very far from it; I am but expressing the sentiments of my young fellow students, in entering a protest against flooding our literature with articles *carelessly* prepared, and to which so little time or attention has been given that they reflect discredit upon their authors, leading the inconsiderate part of their readers to think the less of our profession.

There are plenty of earnest, quiet workers, whose ability commands the respect and esteem of eminent men in other professions, and who

are practicing Dentistry with an ambition higher than to "scale off salivary calculus" and "dig out and fill up little holes;" who believe that their profession demands as high an order of intelligence as does medicine, and who keep themselves thoroughly informed upon all topics bearing upon their specialty. These men should come forward, and give the young men the benefit of their experience and example, and encourage them to united and individual efforts in the field of dental literature. Then we will hear no more of those kiting kind of dentists who are so erratic and inclined to soar. SHAFTER.

JEFFERSON COLLEGE OF MEDICINE AND DENTISTRY.

From the Fort Madison Democrat.

Wishing to do justice always to all men, and never to misrepresent in the least in our capacity as a journalist, we have concluded to make the *amende honorable* to Geo. Bennett, M. D., and the "Jefferson College of Medicine and Dentistry" of St. Louis, Mo. In our issue of Sept. 30th we published the following:

"A SWINDLE.—A scalawag calling himself Dr. George Bennett, of St. Louis, Mo., is traveling through the country selling medical and dental diplomas from 'Jefferson College of Medicine and Dentistry.' The scoundrel claims that a college by that name has a charter from "the court," and that Rev. M. L. Louis is President; Dr. R. M. Swander, Vice President; Dr. S. C. Ross, Secretary; Dr. T. E. Parsons, Treasurer; and W. W. Wheeler, Attorney. His plan is to get a fee of ten or twenty dollars down, and then he submits a list of printed questions, which, if answered satisfactorily, entitles the applicant to a degree of D. D. S., on payment of an additional fee of forty or fifty dollars.

The whole matter is a very bold and abominable swindle, and the press will do well to pass Dr. George Bennett around."

On the 6th inst. we received the following letter, which, for fear of consequences, and to do the "Professor" exact justice, and as a part of our retraction, we pulish *verbatim et literatim.*

It reads as follows:

BURLINGTON IA Oct 8th 1874
FORTH MADISON DEMOCRAT
Henry. L. Schroder
Dear Sir

I see an article in your paper of the 30th of September last that it seams to me you are makeing Charges that you

Can not substanuate in regard to my Character and the standing of other gentlemen Connected with Jefferson Medical & Dental College you Call me a Swindler and a Scalawag and that Jefferson College is a swindle now sir I have no doubt but what you have been led into this unthoughtedly without making the necessary investigation and I would advise you to envestigate the matter and Correct it for if you do not I feel honor bound to make you do so I think I know the * * * hound that gave you your information and he had better take notice and govern himself accordingly if you will take the pains you Can find out when Jefferson College was chartered I will just say that it was chartered the 7th of August 1874 and has some as able men Connected with it as thare is in the City of Saint Louis mo and in Connection with the Charter we have $500000 00 worth of stock to build suitable Buildings and endow it with the enterprise is a noble one and if you will take the pains to look at it you will rather encourage it that to throug Cold water upon it this sir is a friendly warning and I hope you will do me and the College the justest to undo what you have don for if you do not I undoubtedly will make you prove it if you will retract the past in your paper and send me one to 1502 North 8th Street Saint Louis mo we will be friends and if you are ever in our City we will take great pleasure in showing you our new enterprise please drop me a line at this place yours Respectfully GEO, BENNETT, M, D,

*Where the stars are we leave out a couple of adjectives not necessary to the sense.

While reflecting seriously over this letter we received a call from Dr. B., and in our conversation with him found him entirely courteous and gentlemanly. We became convinced that he would neither cut a throat nor scuttle a ship, and that he was probably more sinned against than sinning in his career as traveling Professor of Jefferson College. This, from our intercourse with him, and the literary merits of the letter, appeared to us to be conclusive. Now but for the press of business and excitement of election we should have made this retraction last week.

The Doctor remained only a few hours and the next morning after he left we received the following :

Jefferson College Medicine and Dentistry, Incorporated under the General Laws of the State of Missouri, August 9, 1874.

Office of Secretary, 1502 North 8th street,

ST. LOUIS, MO., Oct. 9th, 1874.

HENRY L. SCHRODER, PROP. FORT MADISON DEMOCRAT.

Sir :—In your issue of Sept. 30th, I notice an article, pronouncing

the Jefferson College of Medicine and Dentistry, a bold and abominable swindle, and Dr. Geo. Bennett a scalawag. I hereby have the honor of informing you, that the article mentioned, is a bold and unpardonable falsehood. Dr. Geo. Bennett is a Professor in our College, and a physician of over twenty years experience, also a dentist of superior ability. He has authority from this College to receive applications for examination, and if the applicants pass the examination necessary, they will receive the degree of M. D. or D. D. S. as indicated by the examination. Dr. Bennett gives no diplomas, except the questions which we furnish are properly answered and passed upon by the board of directors and faculty here, he is then furnished with the diploma completely filled up except his own signature, which he attaches, and then delivers the diploma to the proper person. We grant diplomas by virtue of our charter vesting in us the right so to do, and whether the applicant has graduated or had one course of lectures, or no lectures at all, if they can pass the examination and are recommended by Dr. Bennett as of good social standing, they will receive the degree applied for. We do not now nor never will do as many other colleges have done, grant diplomas in a secret clandestine manner, for a certain fee, but we do intend to boldly respect the claims of worthy men, and defend ourselves against any malicious and libelous assaults from whatever source they may come. You have certainly been misinformed in this matter, and we shall expect an early and full retraction.

Respectfully,

F. E. Parsons, M. D.

Secretary Board of Directors.

PS. Dr. Bennett will probably call and show you his authority to act for the College and convince you that the College is substantial.

This was duly attested by a copy of the seal of the great State of Missouri, and a very fine impression of the new seal of "Jefferson College of Medicine and Dentistry." After receiving this document and finding that "our foot was certainly in it," if we did not retract, we concluded to write and publish this retraction, and give the College and its learned Professor, who was traveling in its interest, the benefit of this column of gratuitous advertising.

Our Dentists, all of whom are gentlemen of well known integrity and professional skill, have handed us the following, referring to our 30th of September article.

State of Iowa, Lee County, ss.

I, U. D. Taylor, John Rix, J. Montgomery, each on my oath legally administered, depose and say that the attached article, which was published in the Fort Madison DEMOCRAT of Sept. 30th, 1874, is entirely true except that the amount to be paid down was five dollars and that the additional amount to be paid on receipt of the Diploma was sixty dollars.

My knowledge of the truthfulness of the article in question and the above statement is derived from personal conversation with the said Bennett; and I would state further that the said Bennett represented that the diplomas were being sold to raise means with which to purchase College grounds, or to make payment thereon, and that stock was to be issued and placed on the market to raise money with which to build and endow the College. I had further conversation with said Bennett in reference to this matter which I do not deem necessary to be here repeated.

U. D. TAYLOR,
J. MONTGOMERY,
JNO. RIX.

Subscribed and sworn to before me this 12th day of October, 1874.
(SEAL) W. C, HOBBS, Notary Public.

We hope the above will be entirely satisfactory to Professor Bennett, and to the other gentlemen who compose "Jefferson College of Medicine and Dentistry," and we think they ought to send us a diploma for so lengthy an advertisement.

We should state in conclusion that Prof. B. informed us that he had ceased his efforts to sell Diplomas in Iowa, and hence we feel the greater pleasure in making this retraction.

BROOKLYN DENTAL SOCIETY.

The seventh annual session of this Society was held on Monday evening, October 12th, 1874.

The following officers were elected for the ensuing year:

President, Dr. M. E. Elmendorf; Vice-President, Dr. C. W. Harreys; Recording Secretary, Dr. C. P. Crandell; Corresponding Secretary, Dr. A. N. Chapman; Treasurer, Dr. F. W. Dolbeare; Librarian, Dr. C. H. Biddle.

C. P. CRANDELL, *Recording Secretary.*

ANALYSIS OF AN OLD SERVANT.

By Thomas Fletcher, Esq., F.C.S.

Having to remove a loose upper molar a few days ago, I noticed in the crown a large old amalgam plug which was practically sound. On inquiry I found this plug had been inserted at least thirty years ago, and it showed on analysis the following composition:

Mercury	64·24
Silver	33·07
Copper	2·69
Gold	A trace.

It proved to be, in fact, nothing but coin silver with nearly double its weight of mercury. There were visible signs of very considerable expansion, the plug was above the level of the crown, and the edges of the enamel were apparently burst off all round, but there was no trace of further decay; tooth substance hard and black where in contact with the plug, and face of plug much discolored, but easily scraped clean and bright.

This was the only tooth in the mouth which was loose, and the question remains as to whether some of the excessive quantity of mercury did not yet absorb and cause the mischief. With regard to the use of excessive quantities of mercury, I have had in hand for some time a series of experiments, but they are at present in an incomplete form, as the time required is necessarily very great. So far as the results go at present, six plugs of different alloys, containing proportions of mercury varying from 7 to 10 parts to 10 of filings, have been exposed to a current of steam and air mixed, the result in each case being a distinct loss of weight; and in seven plugs, also of different alloys, containing from 2 to 5 parts of mercury to 10 of filings, there is up to the present a trace of loss in one only. The arrangement for these preliminary experiments has been crude, but I am fitting up a properly constructed apparatus specially for the purpose, and will, after sufficient time has elapsed, give both the proportion of mercury in each case, and the loss per cent. (if any), with the comparative power of retaining the form of the cavity in which they are packed as affected by proportion of mercury. Some of the plugs containing a large proportion of mercury appear to have lost their sharp outlines. The current of steam and air is obtained from the engine, which is only working about fifty hours per week, and therefore a month's exposure will take, allowing for lost time, nearly

four months. In the meantime I shall be glad to give a complete analysis of any plugs which have done good service in the mouth for any great number of years, provided the complete history and the fullest details are given for publication ; the only reservation I am disposed to make is, that the tooth and plug are forwarded complete, to enable a clear description of its condition to be given, and that the plug shall have remained sound and perfect for at least fifteen years.

[*British Journal of Dental Science.*

NEW YORK ODONTOLOGICAL SOCIETY.

The Annual Meeting of the Odontological Society was held in Brooklyn, on Tuesday evening, October 20th, at the residence of Wm. Jarvie, Jr., at which the following officers were elected for the ensuing year :

President, A. L. Northrop ; Vice-President, Benj. Lord ; Recording Secretary, Wm. Jarvie, Jr. ; Corresponding Secretary, Wm. Carr ; Treasurer, C. A. Marvin ; Librarian, W. E. Hoag ; Curator, S. G. Perry ; Executive Committee, W. A. Bronson, E. A. Bogue, C. E. Francis.

AMERICAN SODA.

One hundred and eighteen thousand tons of crude soda at fifty dollars per ton is reported as about the annual importation of this salt, used, as our readers know, in the manufacture of soap, glass, and other articles of general consumption. This will convey some idea of the importance of the great and wonderful natural deposits of carbonate of soda, which have been found in the West, six hundred miles beyond Omaha, and forty miles north of the Union Pacific Railway. Deposits of soda are here found in all stages and conditions. In some cases, alkaline lakes are encountered, the water saturated with the carbonate. One especial deposit, of many acres in extent, consists of a crust of carbonate of soda more than six feet deep, under which is a strong alkaline liquid. This great deposit lies there, waiting for people to come and take it away. In quality it is superior to the crude article now manufactured, as it contains twenty per cent. more of carbonate of soda ; while in cost it is very cheap, as it may be delivered in New York, when the railway to the deposits is opened, for thirty dollars per ton. The soda trade is evidently destined to change. Instead of employing vessels to bring the product here, we shall soon fill them with improved cargoes of the article to go abroad.—*Exchange.*

NOTES.

The frontispiece is reproduced from a steel engraving of the seventeenth century, and introduces the German dentist of that time in his office. We have another engraving somewhat similar in character (from an old English work), which will appear in one of the first numbers of the coming year. [Ed.

We have introduced so much concerning oxygen gas and Dr. Priestley, its discoverer, that we hesitated long before deciding to reprint the address delivered by Prof. Huxley, at the presentation of the Priestley statue to the town of Birmingham, England; but it is every way so interesting and so admirable that we have introduced it, and now commend it to our thoughtful readers. [Ed.

Dr. N. W. Kingsley, having been abroad during the summer months, is returned too late to furnish us copy for this issue of the Miscellany. Engravings have been made for his next article, and subscribers for 1875 may expect to hear from him speedily.

An Extraordinary Surgical Operation.

In our March number, page 110, we recited the occurrence of an accident to Mr. Palmer. We now find the following sequel recorded in the *Tribune*.

An extraordinary surgical operation was performed at Glen Falls recently by Dr. McLean, of Troy, assisted by eminent surgeons of Troy and that vicinity. Last December, Marion C. Palmer, of Gansevoort, N. Y., swallowed a silver dental plate, with four front teeth attached. Several unsuccessful attempts have been made to recover it by probing. An incision was made in the œsophagus, and the plate was found four inches below the clavicle and successfully removed. The teeth had become detached and passed into the stomach. Palmer has been unable to swallow any solid food since the accident. The plate was an inch and a half long and three-fourths of an inch wide.

New York, Oct. 9th, 1874.

Editor Miscellany:

Sir: Will you allow me to correct a reportorial error occurring in the October issue of your Dental Miscellany, vol. 1, No. 10, page 367.

I wish to disavow authorship in the remarks there attributed to me. It must have been a clerical mistake, for the reporter has prefixed my name to the remarks of some other gentleman. Briefly stated, I will give the gist of my remarks submitted at that time on Dr. Perry's case.

Dr. Fitch: I disapprove the use of aqua pura as the only medication employed in such cases. I use for treating abscesses, disinfectants, escharotics, anesthetics, rubefacients, etc. I approve of injecting medicine into the root canal, and forcing it through the gum fistula. Do not see that the swelling under the chin has any connection whatever with the abscess or tooth lesion. Can call to mind numerous similar instances that had responded favorably to proper medication, and the teeth have given satisfaction for many years, and continue healthy, so far as I know; indeed, I am treating and saving such teeth almost every day. I think I would not have yielded to the wishes of the parent under the circumstances, as detailed by Dr. Perry, in the

extraction of the tooth. I think such abscesses readily cured, unless complicated with diseased action, involving the death of contiguous bony tissue; and even under such unfavorable circumstances, by proper medication, the parts may be restored to health, and the teeth rendered serviceable for years after.

By inserting the above few remarks in the next issue of your Journal, you will confer a favor, and set me right upon the record. Respectfully,

C. P. FITCH, M.D.

Welding Compounds.

A correspondent in a western town sends us a recipe for making a compound for welding steel. It is as follows: 6 oz. copperas, 4 oz. lamp black, 1½ lbs. salt, 3 oz. prussiate of potash, ½ oz. iodide of potassium, 1 oz. plumbago, 10 lbs. iron filings, 3 oz. oxide of manganese, 1 lb. caustic soda, 2 oz. sulphate of copper, 3 oz. iron rust, 3 oz. litharge, 2 lbs. borax, and 25 lbs. white sand. We have not tested the compound, but are much obliged for the recipe. If we may venture a suggestion, we should say that the compound might be improved by adding 2 lbs. green tea; 2 papers fine cut chewing tobacco; 1 pint of vinegar; 1 oz. red pepper, and sugar to taste. These ingredients would certainly do no harm, and, perhaps they might improve the compound.—*Iron Age.*

Dr. George E. Hawes.

Dr. George E. Hawes, the subject of this brief obituary, was born in Wrentham, Massachusetts, May 28th, 1810. His father, Col. George Hawes, was a man of integrity and uprightness, whose patriotism was of an active character in our Revolutionary struggles, he filling his place in the ranks of the Colonial patriots, battling against aggressive and oppressive acts of the mother country; and subsequently serving the State in its Halls of Legislation. His mother still survives him at the advanced age of ninety-five years — having laid all the members of her immediate family in the resting-place of the dead.

Dr. Hawes commenced his preparatory course as a dentist in the office of the late Dr. John Lovejoy, and after completing his course of study with him, he commenced the practice of his profession in Park Place, and after years of diligent and successful practice there, he located in Bond Street, where he continued his professional career until laid aside by impaired health. He was an eminently successful dentist, retaining the confidence of his patients by the perfection of his operations, and his uniform urbanity.

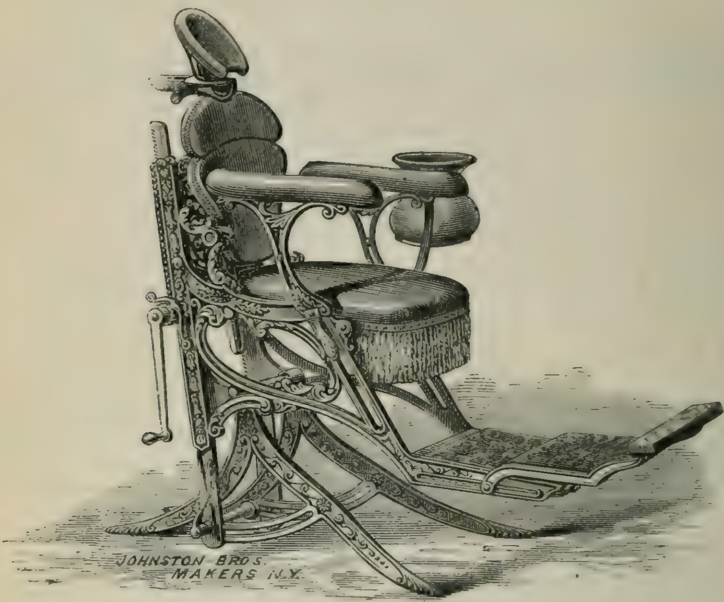
By the members of the dental profession, he was universally esteemed; his opinions on difficult cases in practice were appreciated because they were judicious and sound, and there are none who knew him, who do not feel that a safe operator has been lost by the community, and an appreciated and safe counselor by the profession. We shall miss his acquaintance and counsel.

Dr. Hawes was a Christian gentleman, and to appreciate him it was only necessary to have his acquaintance.

The family who survive him, have, in the recollection of the past, and in the assurances of his blessed future, all the consolation necessary to assuage their great grief, and make supportable their great bereavement.

Signed, J. G. AMBLER,
On behalf of Committee.

THE
Morrison Dental Chair.



Price $150.00, or, with Castors, $160.00. Boxing, $5.00.
Spittoon Attachment, $8.00.

It possesses great superiority over any chair before offered to the profession, and is at the same time less expensive than any other first-class chair. Some of its points of superiority we here enumerate :

1st. All the advantages of any low-based chair, and also of any high-based chair, are here secured in a single chair. In it the patient can be placed lower than in the lowest-based chair made, or higher than in any other of which we have knowledge. At its lowest position the seat is fifteen inches, and at its highest position forty-two inches above the floor.

2d. The operator using the Morrison Chair can either stand or sit at his work, as he may choose, working with equal convenience in either position.

3d. It has been a very general complaint that dental chairs are too wide at the back, so holding the operator away from his work. Here this difficulty is overcome. The chair is narrow at the back, so that the operator need not stretch to reach the patient, but *can lower either arm of the chair out of the way* and so be as near the patient as he may choose.

4th. It can be changed from its lowest to its highest position in seven seconds—a celerity impossible in any chair raised by a screw.

5th. It can be very readily and perfectly adapted to operations on children of any age

First. Because in it the child can be raised as high as needed for the tallest operator.

Second. It provides a comfortable back and head rest, exactly as for grown persons.

Third. The footstool can be lengthened or shortened, to suit children of any size.

6th. The back of the chair can be lengthened or shortened rapidly and at will.

7th. The lower part of the back can be thrown forward to support the small of the patient's back.

8th. The chair, when adjusted to any position, is firm or steady wherever placed, and this is *especially true of the head-rest.*

9th. It occupies less room than any other operating chair.

10th. Although the footstool, when at its extreme length, is much longer than any other made, yet a person of ordinary weight can stand on its extremity without tipping the chair.

Nota Bene.—We have substituted brass cogs and castings, for those that experience has shown in any degree faulty, and the chair, *as now sold, is as strong as any chair made.* Reference is made to this because several of the chairs first sent out, failed in the cogs by which the chair is raised, and in the castings which throw the lower back-pad forward. These have been replaced in every instance with brass cogs, without charge on our part, and to the complete satisfaction of the purchaser.

We are gratified in being able to refer to the commendations, which follow, from some of the leading practitioners of the country.

JOHNSTON BROTHERS,

812 BROADWAY, N. Y.

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10 W. 11*th St., New York, July* 24*th*, 1873.

Messrs. Johnston Bros., Broadway:

I find your Morrison Chair gives great satisfaction. My patients all admire, and voluntarily pronounce it the easiest they ever sat in. The movable back-piece, arms and foot-rest, which latter the patients can adjust at pleasure without changing their position, the lowering of the whole chair, which admits stepping into it without the slightest inconvenience, are points which call forth immediate praise from the patients, and give great satisfaction to the operator.

As a child's chair it is invaluable; the little patients can be "put just where you want them," while the operator can with ease change the position of the *whole* chair, without disturbing the patient in the least. These points, combined with others which it has, make this chair the most desirable of any which I have seen. Very respectfully yours, A. L. NORTHROP.

Johnston Bros., *Hartford, June,* 15*th*, 1873.

Gentlemen: I have used the new Morrison Chair several hours every day since its arrival here, and feel in duty bound to say that there is no chair manufactured that can compare with it.

Its adaptability to children as well as adults, support for the small of the back—in fact, all its motions are perfect, and I see no chance for improvement. Dr. Morrison and yourselves have my heartfelt thanks for the great benefits you have conferred upon the profession in perfecting the chair as well as the Dental Engine. Very truly yours, GEO. L. PARMELE, M.D., D.M.D.

Messrs. Johnston Bros., *Hartford, July* 24*th*, 1873.

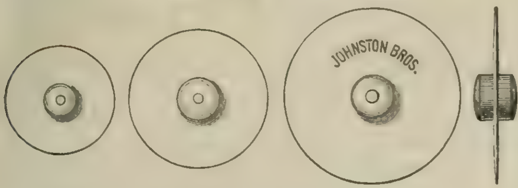
Dear Sirs: The Morrison Chair meets all my expectations. I like it very much: in fact, I feel perfectly satisfied that I have one of the most complete chairs yet made for the comfort of patients and the convenience of the operator.

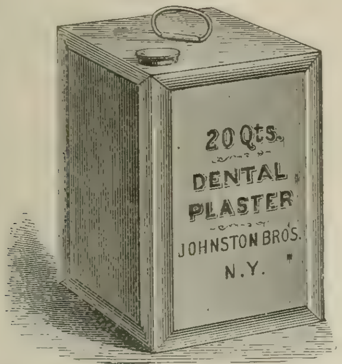
Yours truly, JAS. McMANUS.

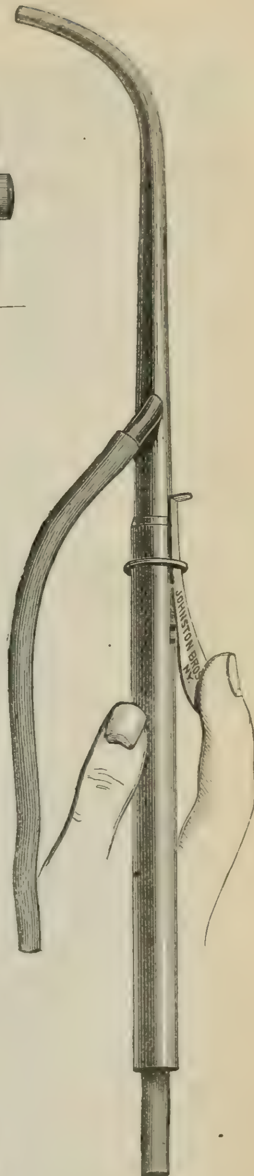
Boxwood Disks for Carrying Polishing Powder.

Four sizes, from ⅜ to 1 inch in diameter. Prices respectively, 5, 8, 12 and 25 cents each.

JOHNSTON BROS., 812 Broadway.







DENTAL PLASTER IN METAL CASES.

These are each provided with a funnel-shaped mouth in one corner, which is hermetically sealed, through which the plaster can be emptied without injuring the case. This mouth is closed by a screw cap.

4 quart cases, each	$0 60
12 " " "	1 25
20 " " "	2 25

Barrels and half barrels always on hand.

JOHNSTON BROS.,

812 Broadway, New York.

KINGSLEY GAS BLOWPIPE.

Every one sold by us has given satisfaction. It has no equal.

Price	$5 00
" Nickel Plated	5 50

JOHNSTON BROS.

REMODELED

Morrison Dental Engine.

New York, May 25, 1874.

Johnston Brothers.

Gentlemen:—You ask my opinion of the Remodeled Engine:

I have now used mine two weeks, and would say that its advantages to the operator over the old style are nearly as obvious as were those of the first Engine over hand work. John T. Metcalf.

The cut on the following page well illustrates the new Engine, and, with the subjoined description, will make the alterations plain to all.

DESCRIPTION.

1st. The rocking movement of the upright standard is abandoned, and a rigid, handsomely plated, and tapering column substituted.

2d. From the top of this column extends an arm directly in front of the patient. This arm swivels upon the column, and is adjustable vertically, being secured by a brace at any height desired, thus bringing its end directly in front of the patient's mouth, whatever be the height of the operating chair.

3d. Attached to the end of the adjustable arm by a most ingenious universal joint, is a shaft about twelve inches long (corresponding to the extension arm of the old engine), which carries at its end the handpiece.

a. This shaft, being short, is much lighter than the old one, enabling the operator more perfectly to feel his work, and is also less liable to tremor.

b. Both sides of the mouth may be reached without changing the position of the engine.

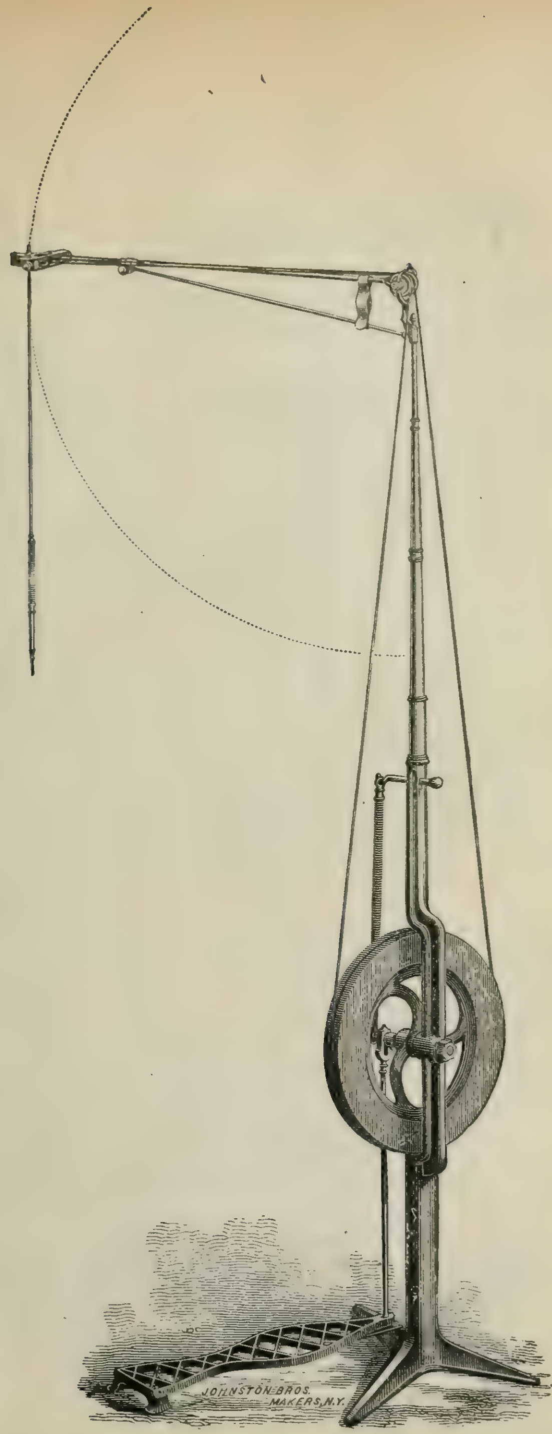
c. By lowering or raising the adjustable arm, according as the operation is upon the superior or inferior teeth, the driving spring is but slightly flexed, and great steadiness secured.

4th. The off-centre spring is attached above the driving wheel, partially supporting it and reducing the friction.

5th. The handpiece is much smaller, and the burs so secured that they may revolve in either direction, and at the same time be used either with a pushing or pulling cut, and this without the use of a catch spring. Old style burs can be refitted to this handpiece.

The model engine of this pattern, as above described, has been for several weeks in use in the hands of one of the best operators in our city, and is pronounced by him a very decided improvement.

JOHNSTON BROS.



REMODELED MORRISON ENGINE.

Price, $60. Right Angle Attachment, $5. Boxing, $2.

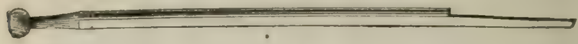
JOHNSTON BROTHERS,

Dental Depot,

812 BROADWAY, NEW YORK.

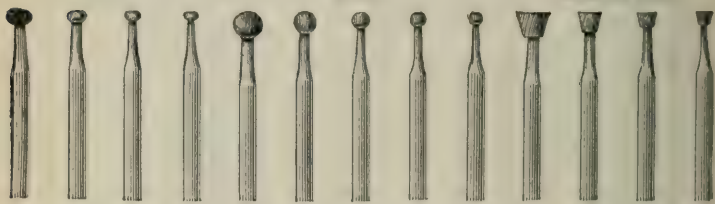
Equipment for Morrison's Dental Engine.

PLUG FINISHING BURS.



1

OVAL. ROUND. INVERTED CONE.



2 3 4 5 6 7 8 9 10 11 12 13 14

BUD SHAPED. BARREL SHAPED. PEAR SHAPED.

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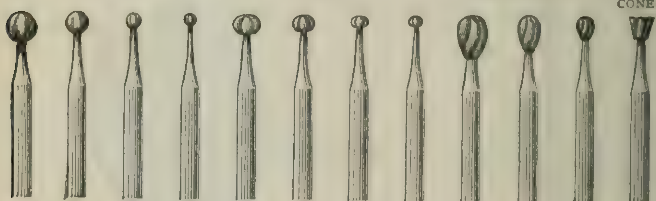
BURNISHERS.

ROUND. OVAL. PEAR SHAPED. INVERTED CONE.



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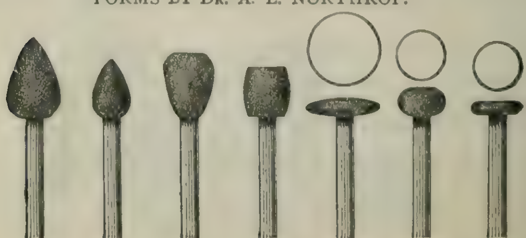
CORUNDUM POINTS FOR MORRISON ENGINE.

FORMS BY Dr. A. L. NORTHROP.



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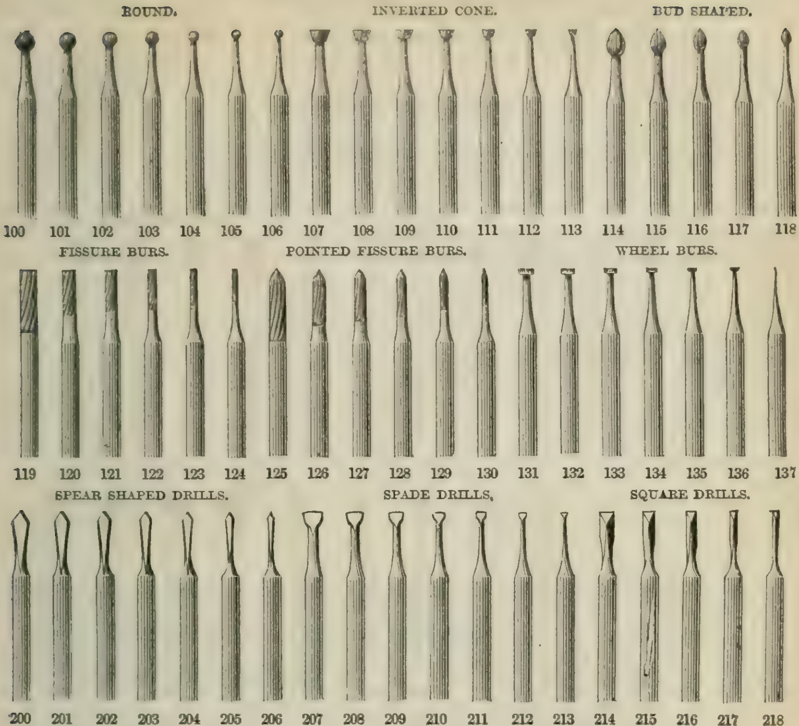
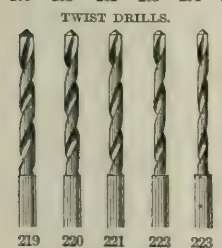
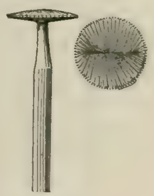
CAVITY INSTRUMENTS.






Price, $1.25.

CAVITY INSTRUMENTS FOR RIGHT ANGLE ATTACHMENT.

We have in stock, and can furnish *Cavity Instruments* for the *Right Angle Attachment*, of all styles and sizes, from Nos. 100 to 218, inclusive.

SCOTCH STONES, MOUNTED.

The Scotch Stones enable the operator to give a finish to fillings hitherto unattainable, and only need a trial to be appreciated. We have these in stock of forms Nos. 75, 77, 80 and round. Other kinds of stones are now in process of manufacture.

HINDOOSTAN STONES, MOUNTED.

Forms of Nos. 75, 77, 80, and round. Of each shape we make three sizes. The cuts referred to by the numbers represent the large size. These are, beyond doubt, of the greatest utility in cutting either gold or bone. They last longer than any other stone.

LEATHERS, MOUNTED.

We have in stock Leather Points mounted on Mandrils, of forms Nos. 75, 77, 80 and round, designed to be charged with powders, for polishing and finishing fillings.

Screw Mandril. to be armed with leather, wood, etc., for polishing fillings, cleaning teeth, finishing plates, etc.

PRICES.

Finishing Burs,	Per dozen,	$6 00
Stoned Finishing Burs,	Each,	1 00
Cavity Instruments and Screw Mandril,	Per dozen,	3 00
Stoned Cavity Burs,	Each,	50
Right Angle Cavity Instruments,	Per dozen,	3 00
Leathers, Mounted,	"	3 00
Hindoostan Stones, Mounted,	"	6 00
Scotch Stones, Mounted,	"	3 60
Burnishers,	"	9 00
"	Each,	0 75
Corundum Points, Mounted,	Per dozen,	1 50
" " not Mounted,	"	0 75
Bands for Engine,	"	1 50
Twist Drills	Each,	40

IN ORDERING INSTRUMENTS, DESIGNATE THEM BY THEIR NUMBERS, AND STATE WHETHER THEY ARE WANTED TO FIT THE (A,) (B,) OR (C) HAND-PIECE.

Hand Piece, Style A. 

Hand Piece, Style B. 

Hand Piece, Style C. 

We can alter A or B burs to style C, at 25 cents per dozen.

When sending burs by merchandise mail for alteration or repair, attach your *card* or *printed address* to the outside of the package—do not write it. Send at same time a letter containing your count of the burs, and directing the disposition you wish made of them.

☞ Our instruments are all made of the best Stubs' steel. We shall spare no effort to make them equal in every respect to anything offered to the profession.

☞ We are constantly adding new forms and sizes of Plug Finishing Burs, Cavity Instruments, Drills, etc.

DIRECTIONS FOR USING THE ENGINE.

1. In lifting the engine, be sure *not to bend* the arm which carries the hand piece.

2. Whenever the least noise is heard, oil the engine with the best sperm oil. The rapidity of motion renders oil a necessity.

3. The only part at all likely to break, is the small spring, which conveys power at the upper end of the hand piece. It is not soldered to the shaft, but is slipped on by hand. To put on a new spring, take hold of it near the end opposite that you apply to the shaft, and twist as if to *uncoil* the spring, at the same time pushing the spring on to the shaft. You will be greatly aided in removing the broken parts, by twisting, as if to uncoil, the spring. A piece of emory paper will be found convenient to aid in holding the polished shaft.

4. The engine, to run satisfactorily, should be oiled daily ; and the driving-spring should be perfectly straight.

IMPROVED INSTRUMENTS.

We have added to our list three new and very popular sizes of Cavity Burs. One round called 106½, one inverted cone called 113½, one wheel-shaped called 137½. Each is smaller than any before made by us, of its shape. These numbers are neatly put up in dozen and half dozen packages, and are completely protected from oxidation and from rubbing against each other in transportation.

They are very popular, and we frequently receive orders from dentists for from one to three dozen of each.

STONED BURS FOR BURRING ENGINES.—For some time past, we have made to order, a Bur for use in Burring Engines, by the following process: The teeth of the Bur being laid out with extreme accuracy, are filed to *exactly the same length*, but are not brought to a cutting edge. The Bur is now tempered, and each tooth *afterwards stoned to a fine edge.* This secures a Bur perfect in all its cutting edges, and unequaled by anything hitherto offered in the market. Of these we are provided with a limited supply, of both Cavity and Finishing Burs, excepting Fissure *Burs.* (See Price List.)

Thin Boxwood Discs for carrying Polishing Powder, to polish fillings in proximal cavities. These are of four sizes, from ⅝ inch to 1 inch diameter.

We add that the Instrument-stand, elsewhere illustrated, will be found very useful for the convenient keeping of the Engine Instruments while not in actual use.

Besides the form represented in the cut, we have them with smaller holes, and very many more of them, so that each Bur may be kept by itself.

We invite the fullest examination of our Engine Instruments, as regards

The quality of the steel from which they are made.

The shape and finish of the cutting edge.

Their temper.

The rapidity with which they cut.

Their durability.

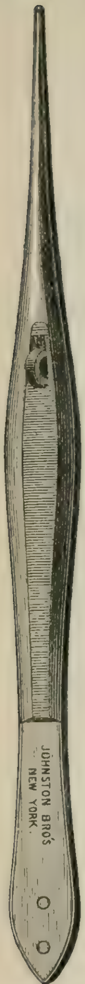
The shaft of each instrument is *round and highly finished,* and can therefore be used without unreasonable and unnecessary injury to the nose of the hand-piece, which injury occasions unsteadiness in all the uses of the Engine.

They will *bear* examination in *quality* and *price.*

JOHNSTON BROS.

ARTERY AND TAPE FORCEP.

REMODELED BY DR. E. A. BOGUE.



These are designed for *firmly* grasping corundum or silex tape, or floss silk, when it is desired to use either of them in the mouth, for inserting or removing tape, rubber wedges, etc., or for grasping arteries, pendulous portions of the gum or other parts during amputation. The points are so formed that they interlock in the substance of the material to which they are applied; and, when they have once taken hold, a spring-catch in the side of the forceps fastens them in position, so that it is impossible for them to slip. They render it almost unnecessary to handle tape or floss silk with the fingers in a patient's mouth.

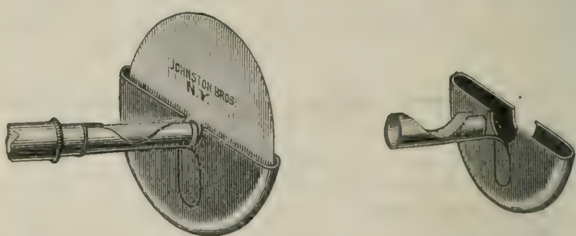
They are also convenient when one wishes to withdraw silk or gilling twine which has become fastened between the teeth, or to remove wet napkins or wooden wedges.

Price, Nickel-plated................$2 75

JOHNSTON BROS.,

812 Broadway, N. Y.

Ives' Tongue and Cheek Protectors.



These admirable little instruments are a protection to the patient, the operator, and to the disc.

They are of two sizes, and together will answer for Arthur's disks of any usual size.

The lips which clasp the nose of the hand-piece are left soft, and can be spread or contracted to snugly fit the A, B, or C hand-piece.

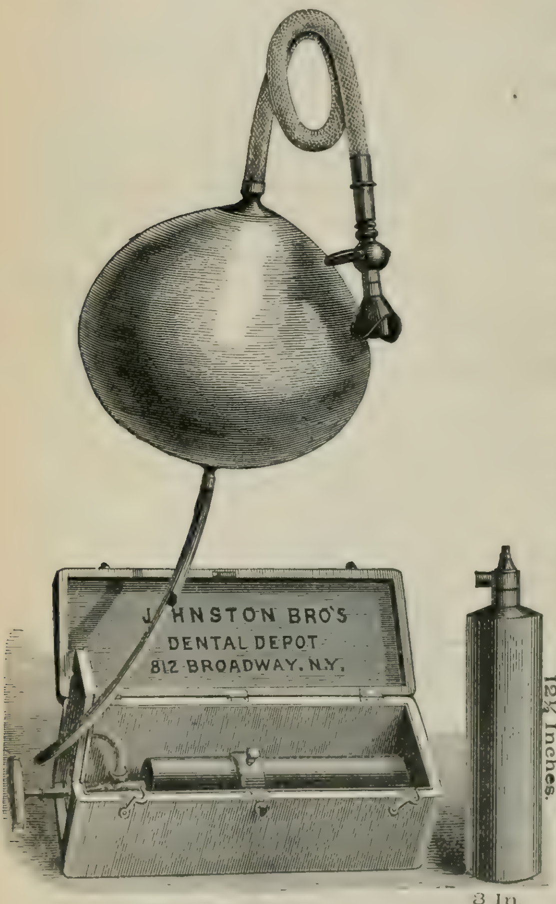
Price, per set..............................	$3 00
Each..	1 50

JOHNSTON BROS.

LIQUID NITROUS OXIDE.

[Revised Circular.]

The increased and still increasing demand for Pure Liquid Nitrous Oxide, and for information concerning apparatus for its exhibition, renders it necessary that we issue yet another edition of our circular upon that subject. As the Surgeon's Case, as first introduced, has proved itself in every way all that we could wish it to be for the place assigned to it, we cannot do better than to repeat here our first description of it.



SURGEON'S CASE.

This comprises a strong cylinder containing One Hundred Gallons of Gas; a strong morocco covered case, provided with an iron ring and set screw, by which the iron cylinder is held in place during use, and its delicate valve protected from injury; also, a rubber bag with rubber tube at one end for admission of gas, while an inhaling tube, handsomely covered on its outside, and provided against any possibility of a collapse by a tin-coated spiral of wire on its inside, is fastened at its opposite end—an inhaler—a nickel-plated wrench and a nickel-plated key. In fact, *all* the apparatus necessary for administering the gas. The whole case and contents weighs about fifteen pounds. This is here shown as open, and the bag which receives the gas from the cylinder, and from which it is exhibited to the patient, is represented as filled, and suspended above the case. The cylinder is also shown as standing at the side of the case. This is the simplest and most popular form of apparatus, and will be everywhere welcomed—because of its portability for use outside of the operating room.

REVISED PRICES.

Complete Apparatus — Surgeon's Case, with Metallic Inhaler. . . . . **No. 1.**	$42 00
Complete Apparatus—Surgeon's Case, with extra sized Bag and Metallic Inhaler. . . . . **No. 2.**	45 00

Boxing either, $1.00.

Each complete apparatus includes a 100 gallon cylinder, filled with Liquid Nitrous Oxide.

Cylinder with 100 gallons of Gas.	16 00
Refilling Cylinder.	6 00
Morocco covered case, with ring and thumb screw, velvet lined,	12 00
Polished bl'k walnut " " " " "	13 00

Of these latter we have only a limited number.

Rubber Bag, with covered inhaler tubing, (about 4 gall. capacity)	5 00
Rubber Bag, with covered inhaler tubing, extra size.	7 00
Inhaler, with spring valves, trumpet mouth-piece, with Plated connection.	8 50
Inhaler, latest style, with two way stop cock, adapted to the use of both dentists and surgeons, with connection.	9 50
Key, Nickel Plated.	1 50
Wrench, "	50
Union, Nickel Plated, (nut and tube), for connecting cylinder and gas bag.	1 50
Covered Inhaler Tubing, per foot.	50
Plated Connection to fit old style Inhaler.	1 00

REMARKS.

When the side of a bag has been perforated, it cannot be repaired, but should be replaced. Send on the tubing by mail, and the bag will be replaced. Price.	3 00

As this cannot be done *properly* except by the use of rubber cement, and by persons experienced in the business, we think it every way advisable that it be entrusted to the rubber workers, and not attempted by the dentist.

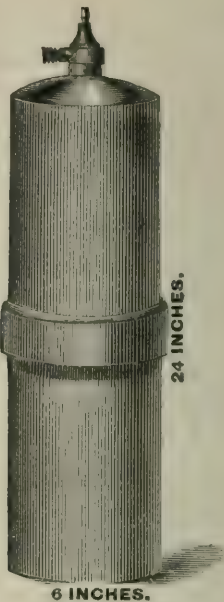
JOHNSTON BROS.,

812 BROADWAY, N. Y.

ONE THOUSAND 1000 GALLONS GAS,

LIQUID NITROUS OXIDE.

1000 GALLON CYLINDER CASE.
Price, $30.00. Boxing, $2.00.



1000 GALLON
CYLINDER.
Price, $36.00.
Boxing, $1.50.

Gas in 1000 gallon lots, 4½ cents per gallon.

The above illustrated apparatus is especially desirable where large quantities of nitrous oxide are used, or where it must be sent a great distance. In this form it is best to ship it by *fast freight*—which makes the cost of transportation very light.

THE GAS CAN BE KEPT FOR ANY LENGTH OF TIME,

AND IS

CONSTANTLY ON HAND AND ALWAYS OF THE BEST QUALITY.

PRICE LIST OF A COMPLETE OUTFIT.

1 Black Walnut Paneled Case, octagonal	$30 00
2 1000 gallon Cylinders at $36 00	72 00
2000 gallons of Gas at 4½ cents per gallon, being 25 per cent. less than price in small cylinders	90 00
1 Bag, with covered Inhaler Tubing	5 00
1 Bag, extra size, with covered Inhaler Tubing	7 00
1 Key, Nickel Plated	1 50
1 Wrench, Nickel Plated	50
1 Union, " "	1 50
1 Inhaler—Metallic—with two way stop-cock and connection	9 50
	$217 00
Deduct Gas	90 00
Cost of Apparatus	$127 00

By purchasing under this plan a saving of 25 per cent. is effected in the cost of the gas, or on 2,000 gallons of $30.00.

It is right that we should here announce that we have in hand a piece of furniture, which—while it will answer the purpose of the black walnut case illustrated—will also serve as a stand for an ornamental Gasometer.

A cut of it will appear in an early issue of the DENTAL MISCELLANY.

As these large cylinders can easily be sent by fast freight (*the* 100 *gallon size is too small to be so risked*) cost of transportation is reduced to its lowest rate.

JOHNSTON BROTHERS,

812 Broadway, New York.

PORCELAIN TEETH.

Our stock is carefully selected from the factories of the BEST MAKERS, and embraces all of the varieties in use, including Continuous Gum Teeth. We will fill orders on short notice for any manufacture of teeth.

Dentists sending us their orders can rely on receiving prompt attention, and on getting manufacturers' best rates.

JOHNSTON BROTHERS.

DENTAL GUM—RED.

E. Dougherty's Nos. 1 and 2, per lb	$2 75
Whalebone Rubber, per lb	3 50
Dental Gum—black—per lb	3 00
Gutta Percha, per lb	3 00

JOHNSTON BROS.

SUSPENSION DENTAL ENGINE.

(INVENTED BY DR. W. S. ELLIOTT.)

The Dental Engine represented in the accompanying plate is confidently recommended by us as sure to give general satisfaction.

Two or three years ago a few engines modeled on this, the Elliott, plan (suspension from the ceiling) were sold. Though imperfectly constructed, they have been uniformly commended by those who have used them.

Each of the two styles of Dental Engines which have found favor with the profession has advantages peculiar to itself.

In this form the driving power is belted directly to the shaft of the hand-piece, without the intervention of a flexible joint, and so *entirely avoids all the unsteadiness* or "chattering" which is almost inseparable from the flexible joint, even when short, and is unendurable where the non-rigid portion is long.

The Remodeled Engine, shown in our cut, has not only greater elegance of design than the Suspension Engine as previously sold, but, by its construction, obviates several objections to which the earlier model was liable. It was previously necessary to make the hand-piece large and heavy in order to give tension to the belt, and in furtherance of this purpose a considerable ball of metal was suspended from the rear of the hand-piece. As now made, the ball weight is dispensed with, the hand-piece being balanced and tension given to the driving-belt by placing a small pulley on the hand-piece spindle. The hand-piece is reduced to half its original weight, *and the slightest movement at its point can now be felt by the hand which guides it.* Among its advantages, those subjoined are prominent.

1st. It is more steady in its movement than any Engine made.

2d. Being suspended on a cord, it is free to move in any and every direction—hence the bur can be readily applied to any cavity, whatever may be its position in the mouth.

3d. It has an abundance of power.

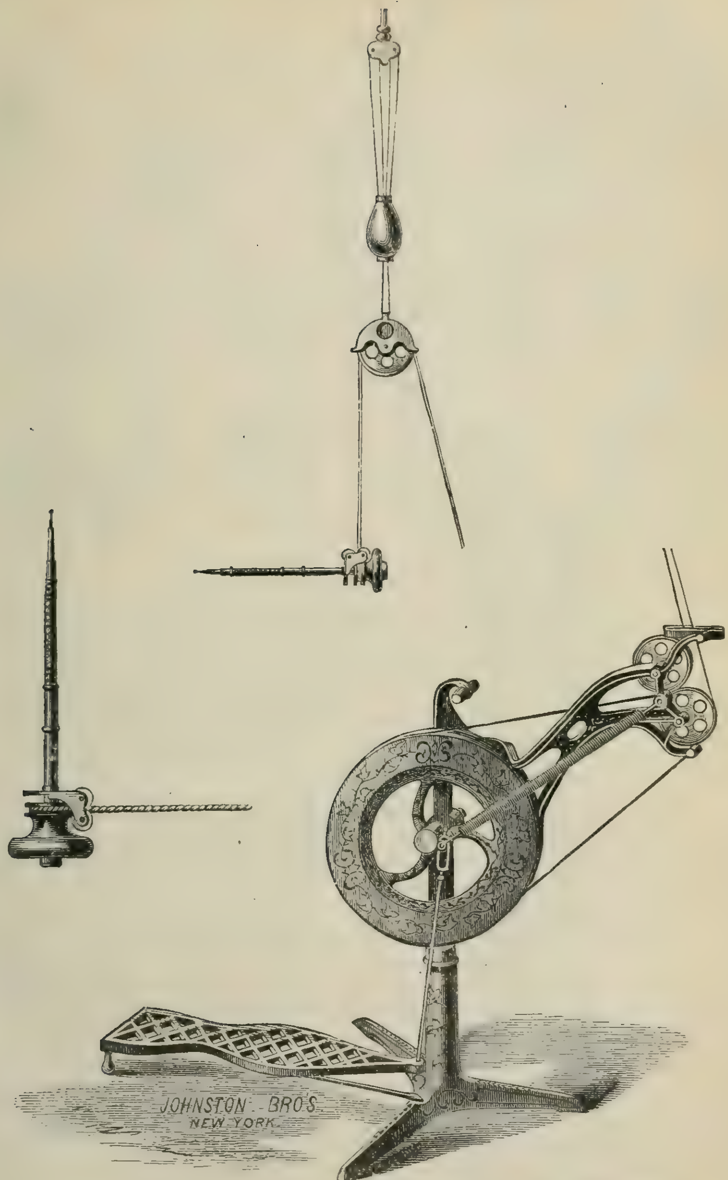
4th. It is not easily broken or likely to need repairs.

5th. It is, above all others, a "*light running*" Engine.

6th. The hand-piece, which formerly was particularly objectionable because of its size and weight, and because of the position occupied by the weight needed to balance it, is now scarcely larger than that of the Morrison Engine, and is fitted to use the same (C style) bur. For the balance-weight we have substituted *a fly-wheel on the shaft which carries the bur.* While keeping the hand-piece well balanced, this gives momentum and greatly increased steadiness to the cutting instrument.

Orders for this Engine will be entered in rotation as received, and promptly filled.

JOHNSTON BROTHERS, 812 Broadway, N. Y.



SUSPENSION DENTAL ENGINE.

(Dr. ELLIOTT'S INVENTION.)

Price, $50.00 Right Angle Attachment, $5.00. Boxing, $1.00.

RUBBER DAM CLAMP FORCEPS.

Of these we offer two styles, both deservedly popular.

DR.

G. A. BOWMAN'S

Rubber Dam

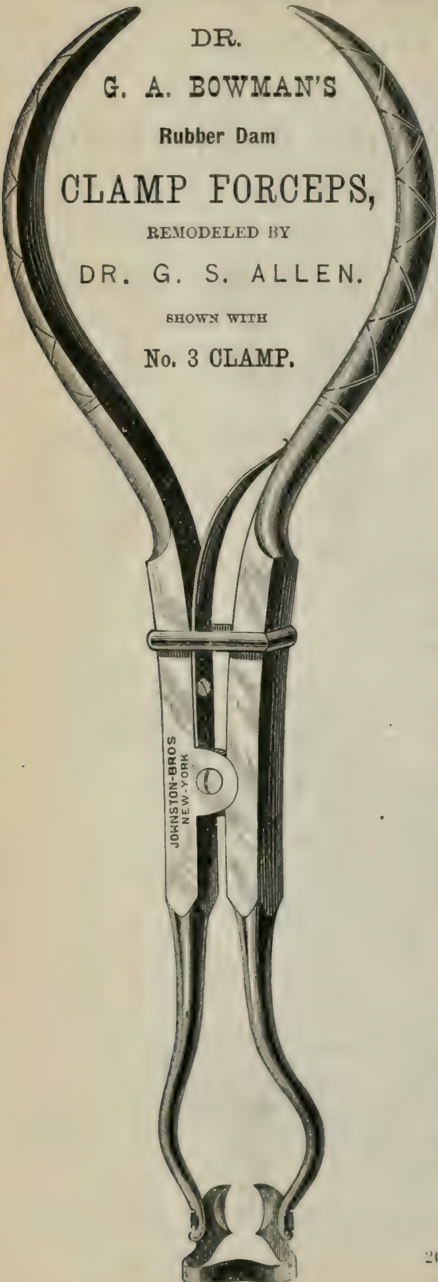
CLAMP FORCEPS,

REMODELED BY

DR. G. S. ALLEN.

SHOWN WITH

No. 3 CLAMP.



POINTS OF DR. T. C. ROYCE'S

Rubber Dam Clamp Forceps,

Shown with Clamp. Handles are exactly like the other style, (Bowman's.)

Both styles of these Forceps have points accurately adapted to the shape of the clamp at the neck, and hence will be found much more convenient than those hitherto offered the profession in this point of adaptation. (See also advertisement of Clamps.)

If so ordered we can supply either style of Forceps with a band, which will keep the Forceps and Clamp extended and ready for use when the hand of the operator is removed, as shown on the Bowman Forceps.

PRICES.

Forceps, either style	$3.00
" " " Nickel Plated	3.50
Complete set of Clamps, embracing eight forms	4.00
Complete set of Clamps, embracing eight forms, plated	4.80
Clamps, each	.50
" plated	60

JOHNSTON BROS.

Morrison Chair—Rotary Movement.

To secure the advantage of this movement for the Morrison Chair, we have provided for it a new style of legs, having broad, ornamented feet. A gun metal roller is let into each of these feet, so arranged that the rollers on the front feet will roll laterally (in the arc of a circle), but not forwards or backwards; and a cam-lock is provided which fastens them in any desired position. This makes it easy to turn the patient to the light. As the front rollers can be locked in position, the operator can use any force he finds necessary in the mouth of the patient without liability of moving the chair in the least.

If it is desired to move the chair from its position (to clean the room) it is only necessary to lift the front rollers from the floor, and the chair rolls easily backwards or forwards on the rollers in the back feet.

PRICES.

Morrison Chair	$150 00
Morrison Chair with rollers and cam-lock	160 00
A new set of legs	25 00
Spittoon attachment	8 00

JOHNSTON BROTHERS.

Rosewood Bracket Table.

This is built up of rosewood veneers, and is highly polished. It is fourteen inches square, and provided with drawers about five-eighth inch deep, which are lined throughout with soft leather. The table is covered with a beautiful article of silk velvet. It is by far the most beautiful table we have seen.

PRICES.

Bracket, with rosewood table	$40 00
Rosewood table	17 00

JOHNSTON BROTHERS.

NOTICE.

We have filled all orders received for head-gear as per our previous announcement, and now withdraw the offer.

We find that the present head-gear requires, for the best work, a heavier standard than that on the earlier style of engine. If any insist on altering their old engine, our price for the head-gear (in exchange for the old head-gear) will be $20.00. Price of either B or C style hand-piece, $5.00. Right angle, either B or C style, $5.00.

JOHNSTON BROTHERS.

NEW YORK COLLEGE OF DENTISTRY,

NINTH ANNUAL SESSION,

1874-75.

FACULTY

WM. H. ALLEN, Emeritus Professor of the Institutes of Dentistry.

FANEUIL D. WEISSE, M. D., Professor of Regional Anatomy and General Pathology.

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C. A. MARVIN, D.D.S., Professor of Mechanical Dentistry.

D. W. WILLIAMSON, D.D.S., Demonstrator of Operative Dentistry.

A. RUST CUYLER, D.D.S., Demonstrator of Mechanical Dentistry.

C. P. KREIZER, M.D., Assistant to the Professor of Chemistry, etc.

Students may matriculate at any time, as the Infirmary is open, for regular students of the College to practice in, the entire year.

The regular course of Lectures will commence middle of October, 1874, and continue until the 1st of March. Three hours of each day of the week (except Saturday) will be devoted to lectures, and four hours to *Clinics*, and practice at the Chair, and in the Laboratory, under the direction of the Demonstrators.

It is with pleasure that we call attention to the removal of the College to more spacious, more convenient and permanent quarters. Our Infirmary is furnished with thirty good chairs and all the appliances. Our Lecture-room will seat, and our Laboratory will accommodate, two hundred students; all on one floor, and up one flight of stairs only.

Tickets for one year's Instruction, including Course of Lectures, Matriculation, Demonstrators', Diploma Fees, and Practice in the Infirmary the seven and one-half months between the sessions...	**$150.00**
For the Course of Lectures only...	**100.00**
Matriculation (paid but once)...	**5.00**
Graduation Fees...	**30.00**

Board may be obtained for from $4 to $8 per week.

For further information address

FRANK ABBOTT, M. D., Dean,

78 West Twelfth Street, New York.

HARVARD UNIVERSITY.

Dental Department.

BOSTON, MASS.

1874-75.

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CHARLES WILSON, D.M.D., Demonstrator in Charge.
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Instruction is given during the Academic year, commencing on the 1st of October and continuing till the 1st of July, but is divided into two terms, attendance upon one of which is required for graduation, the other not. The first, or required term, begins October 1st and continues nineteen weeks. The second, or Spring term, which begins February 15th and ends June 30th, is designed to take the place of pupilage with private instructors, and affords better and more varied instruction than can possibly be obtained in any office.

The mode of instruction in the various departments is as follows, viz.:

ANATOMY.—Lectures, recitations and dissections under the direction of the Demonstrator of Anatomy.

PHYSIOLOGY.—Lectures, recitations and practical demonstrations in the Physiological Laboratory.

CHEMISTRY.—Lectures, recitations and practical work in the Chemical Laboratory, each student having his own desk and apparatus.

SURGERY.—Lectures, recitations, operations upon the cadaver, and clinical and operative surgery at the Massachusetts General and City Hospitals each week. A course of lectures on oral surgery will be given during the Winter term.

OPERATIVE DENTISTRY.—Lectures, operations at the Dental Infirmary of the Massachusetts General Hospital. There were upwards of five thousand operations performed during the last year.

MECHANICAL DENTISTRY.—Lectures and practical work in the Laboratory. The Infirmary provides an abundant supply of patients.

DENTAL PATHOLOGY AND THERAPEUTICS.—Lectures and recitations aided by specimens, models, diagrams and the microscope.

☞ The University Degree, D.M.D. (*Dentariæ Medicinæ Doctor*), is conferred upon those who fulfill the requirements.

FEES.

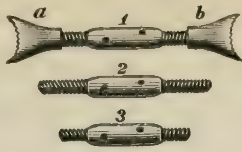
Matriculation, $5.00. Spring Session, $50.00. Winter Session, $110.00.
For the Year, $150.00. Graduation, $30.00.

For further information address

T. H. CHANDLER, Acting Dean,
222 Tremont Street, Boston, Mass.

JACK SCREWS.

Devised by Dr. C. S. LONGSTREET, with Dr. A. McCOLLOM'S Improved Head.



This device is greatly prized by those who have used it.

PRICES.

Full Set, as above, Nickel Plated, screw and two extra bars			$2 50
Jack Screw, Nickel Plated			1 50
Bars,	"	" each	50

JOHNSTON BROTHERS.

IMPROVED TRIPLEX RUBBER-DAM PUNCH.

DEVISED BY DR. F. W. DOLBEARE.

1st. It has in convenient form for use three sizes of punches.

2d. If one size breaks it can be replaced (by mail) at trifling expense.

3d. It is nickel-plated, and so easily kept in order.

JOHNSTON BROS.,

812 Broadway, N. Y.

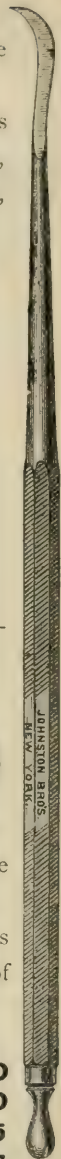
SECOND-HAND CHAIRS.

Dentists who have supplied themselves with the Morrison Chair frequently request us to sell the chairs previously used by them. We therefore can ordinarily supply, at cheap rates, second-hand chairs of any of the varieties hitherto most used. For particulars, address

JOHNSTON BROS.,

812 Broadway, N. Y.

SICKLE SCALERS.



A set of these consists of four instruments of the shape here represented, but with blades of varying thickness.

The blades are hardened and the edges ground square; this renders the instrument equally serviceable as a scaler or a chisel, as it has four cutting edges. No. 4, being very thin and flexible, can be inserted between the teeth.

A VERY USEFUL SET OF INSTRUMENTS.

No. 1 has a stiff blade.

No. 2 has a less stiff blade.

No. 3 has a blade that is quite flexible.

No. 4 has a blade that is very flexible.

PRICES.

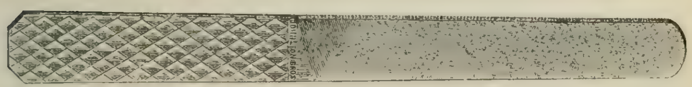
Set complete	$2 00
Single Instrument	50

JOHNSTON BROS.,

812 Broadway, N. Y.

SEPARATING FILES.

Maynard's Patent, May 26, 1874.



These are of the finest quality of steel, and most carefully cut.

We believe them equal to any separating file made, either here or in Europe.

They are made with Maynard's improved handle, which renders it much easier to hold them firmly, and reduces the chance of breakage.

PRICES.

No. 00,	**per doz**	**$1 50**
No. 0,	"	**1 50**
No. 1 to 6,	"	**1 25**
Assorted,	"	**1 25**

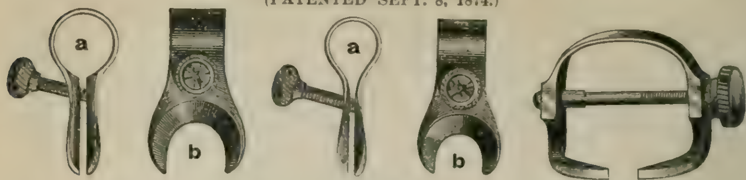
We have on hand former styles at usual prices.

JOHNSTON BROS.,

812 Broadway, N. Y.

Jarvis' Separators.

(PATENTED SEPT. 8, 1874.)



No. 1. **No. 2.** **No. 3.**

The cuts above shown are full size, and represent an apparatus for separating teeth. It is almost impossible to overstate the value and convenience of the devices. By their use, without delay to the operator or appreciable pain to the patient, adjacent teeth may be forced apart for any of the various purposes for which it has been customary to wedge teeth. Crowded teeth can be readily parted by using the separators, so that rubber dam can be applied without difficulty or loss of time. Two forms are shown by the cuts ; of the first form we make three sizes, **No. 1, No. 2,** and **No. 3.**

The Separator consists of a piece of steel, nickel-plated, bent upon itself, having the two ends formed to fit the outer portions of the proximate surfaces of two adjoining crowns.

These jaws are forced apart by the action of a screw, which passes through one and against the other of them. This form is applicable to all the bicuspids and molars. It does not touch the gums or injure the teeth, neither does it cause pain sufficient to be of consequence. The whole instrument is drawn to a spring temper. The jaws are thin, in order to be out of the way, and also the more perfectly to adapt themselves to the surfaces of the crowns of the teeth than if they were rigid. The appliance may be left on, in many cases, while operating, or if removed the space gained by its use may be retained by inserting a wooden wedge.

The Compound Wedge, No. 3, consists of two wedges approaching or passing each other. This is especially applicable to the incisor teeth, and will be found particularly useful in making room for passing rubber dam around crowded teeth. In use, a small strip of wood should be placed over the teeth and beneath the cross-bar, to prevent the points from sliding towards the gum.

PRICES.

Complete Set of Four	$6.00
Any Single Instrument.....	2.00

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